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**NAVAL
RESEARCH
LABORATORY**
WASHINGTON, D.C.

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This document has been prepared as
a reference source of factual information
about the Naval Research Laboratory.

April 15, 1969

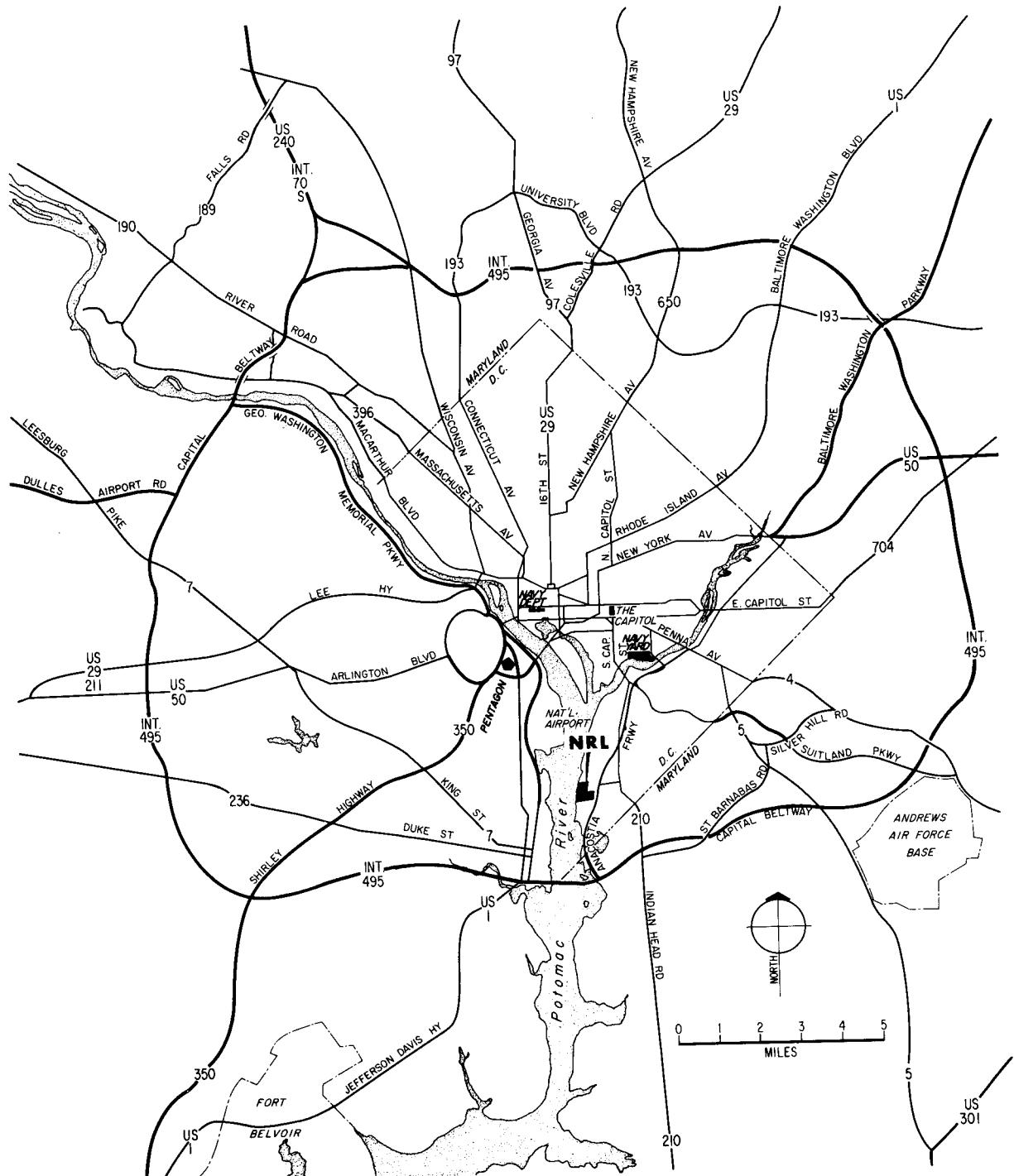
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Part 1

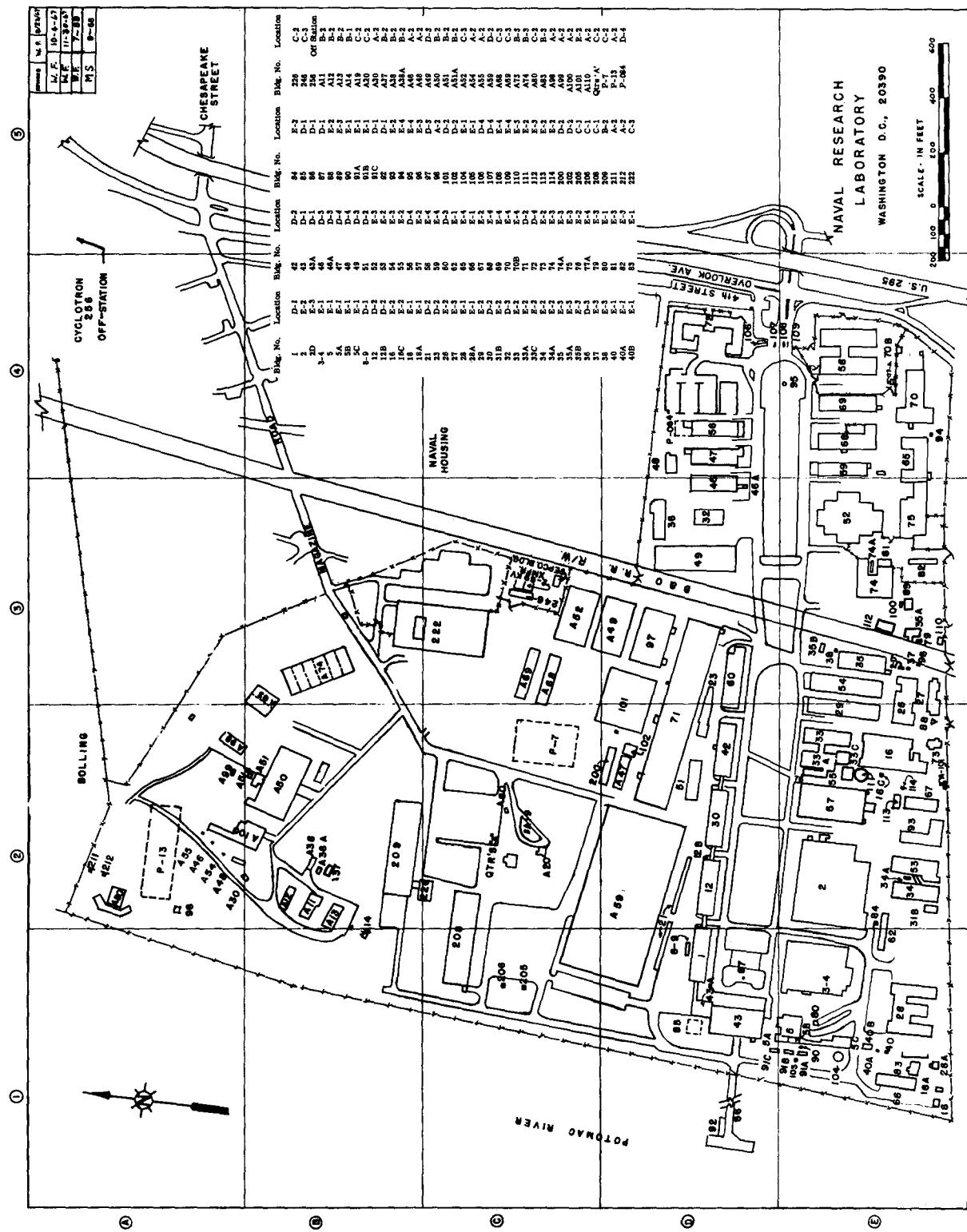
The Corporate Structure



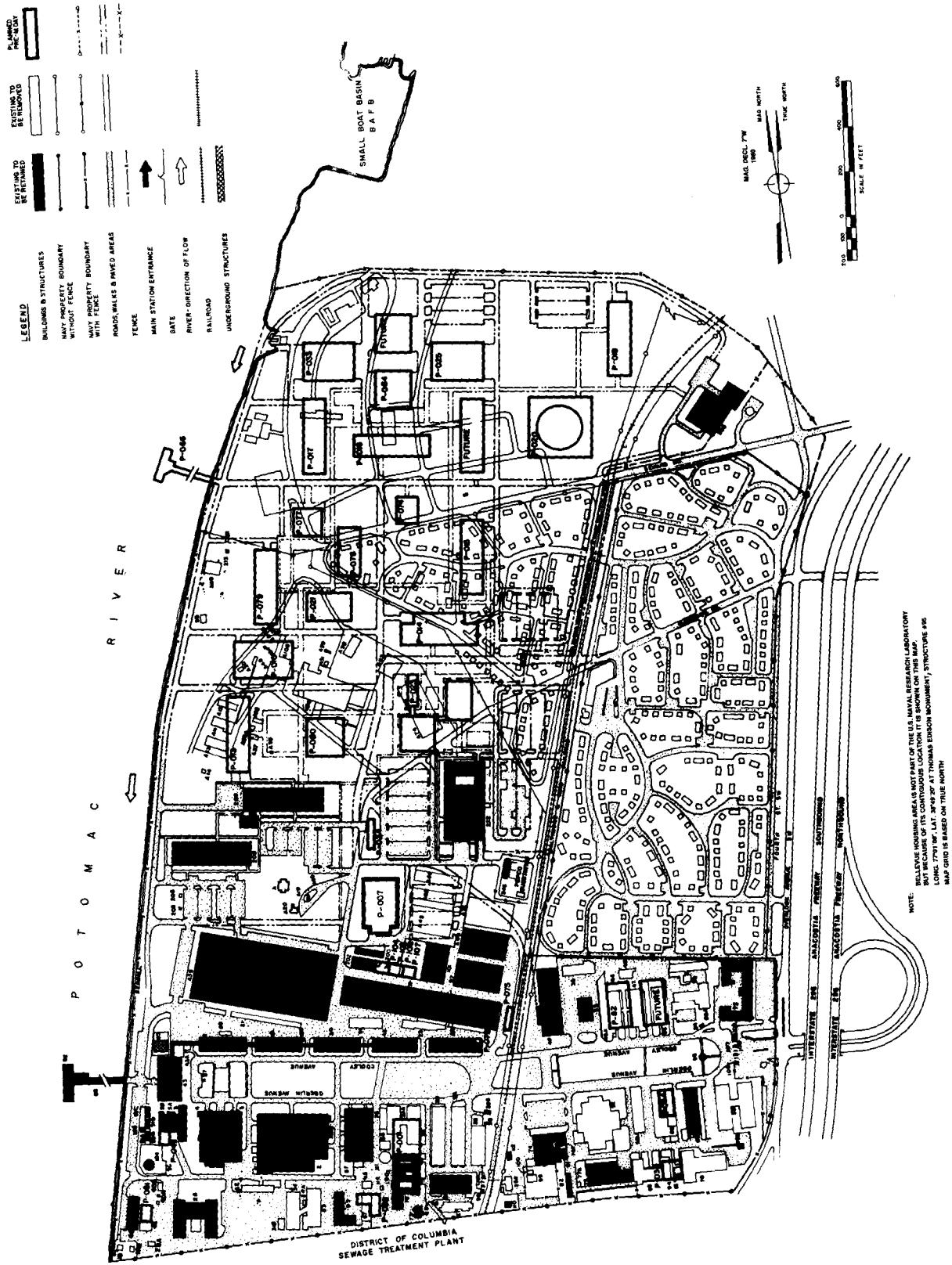
Map showing location of NRL



Aerial view of the Naval Research Laboratory main site



Plat of NRL main site



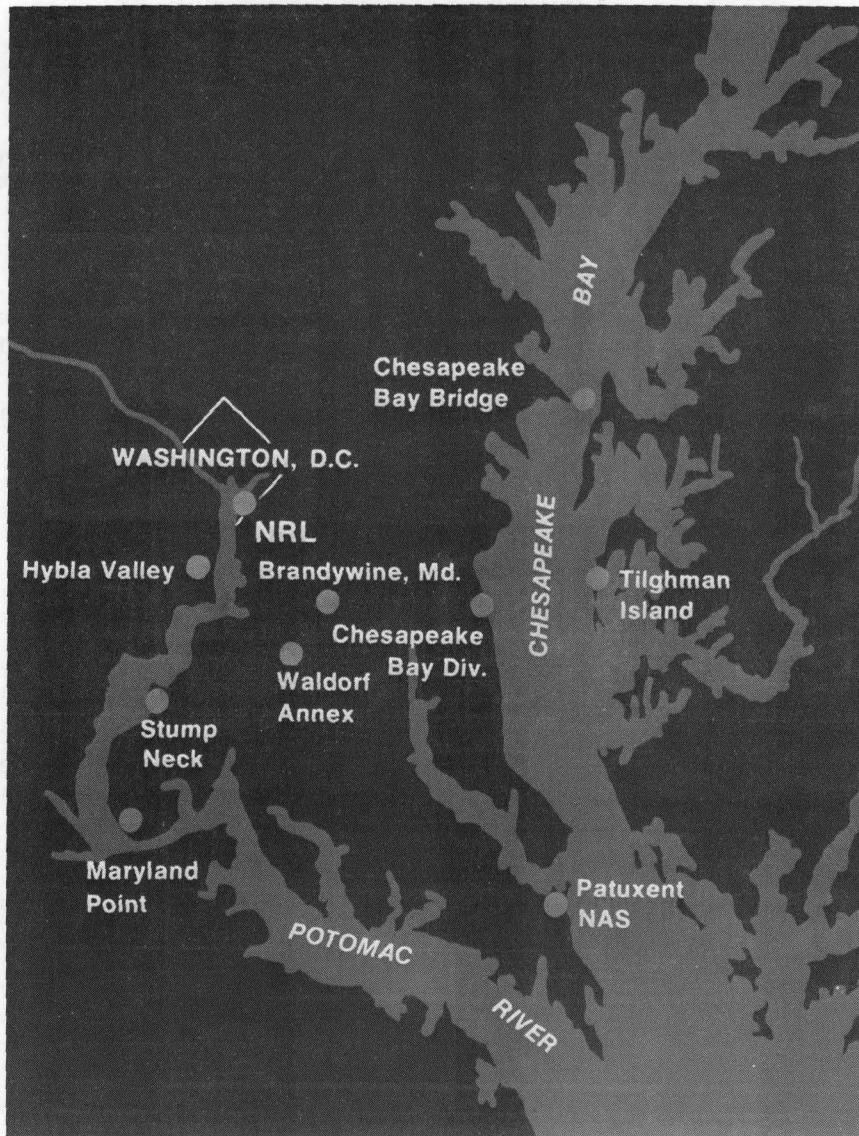
General development plan

NOTE: BELLEVUE HOUSING AREA IS NOT PART OF THE U.S. NAVAL RESEARCH LABORATORY.
BUT BECAUSE OF ITS CONVENIENT LOCATION IT IS SHOWN ON THIS MAP.
LONG. 77°01'18" W LAT. 38°49'20" AT THOMAS EDISON MONUMENT, STRUCTURE #96
MAP GRID IS BASED ON TRUE NORTH

DETAILED LISTING OF NRL SITES AND FACILITIES

December 31, 1968

<u>Station and Location</u>	<u>Acreage</u>			<u>Class I & II Plant Account</u>	
	<u>Fee Title</u>	<u>Easement or Purchase</u>	<u>Permit or Lease</u>	<u>Value</u>	<u>No. of Buildings and Structures</u>
Naval Research Laboratory, Washington, D.C.	129.23		1.29	48,210,334	152
Radio Research Site, Blue Plains, D.C.			24.73	1,900	3
Cyclotron Building Site Bolling Air Force Base, D.C.			5.24	3,572,077	1
Radio Research Site Coast Guard Radio Station, Alexandria, Va.			55.40		
Optical Observation Tower, Federal Records Center, Alexandria, Va.			NA		
Radio Test Area, Hybla Valley, Va.	1262.46			60,000	
A&A Test Site, Shenandoah National Park Luray, Va.			NA		
Optics Experimental Site, Ginny Beach, Va.			0.46		
Chesapeake Bay Division, Chesapeake Beach, Md.	174.90			9,634,743	181
Multiple Research Site, Tilghman Island, Md.	2.00			106,552	8
Dock Facility, Chesapeake Bay, Md.			0.60	13,505	3
Theodolite Station, North Beach, Md.			0.29	800	1
John Hyde Quarry Site, Westminister, Md.			15.25		
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			0.23	1,500	2
2 Foghorn Platforms, Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Chesapeake Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35.16		1,210,410	35
Radio Astronomy Observatory, Maryland Point, Md.	24.30		200.00	229,027	12
Radio Antenna Range, USAF Receiver Site, Brandywine, Md.			22.98		
Metallurgy and Radio Research Site, Stump Neck Annex, Naval Ordnance Station, Indian Head, Md.			5.90		
Free Space Antenna Range, Pomonkey, Md.	14.12	30.25		736,658	12
Navy Radio Research Station Sugar Grove, West Va.				74,091	2
Transducer Calibration Facility Dresden, Lake Seneca, N.Y.			4.52	24,243	2
Satellite Tracking Facility, Blossom Point, Md.			23.00		
Satellite Tracking Station, Roma, Texas	27.84	1.00		725,239	5
Satellite Tracking Station, Raymondville, Texas	171.55	2.85		1,215,770	16
Underwater Sound Reference Division, Orlando, Fla.	10.46			1,184,605	32
USRD, Leesburg Facility, Bugg Spring, Fla.			6.92	167,067	7
Marine Corrosion Laboratory, Key West, Fla.			NA		
Underwater Track Facility Argus Island (near Bermuda)			NA		
Totals:	1840.80	69.26	366.81	67,168,521	



Location of the principal field stations. Others are at Sugar Grove, W.Va., and on Lake Seneca, N.Y. (near Dresden). The Underwater Sound Reference Division is located at Orlando, Fla.

RESEARCH PLATFORMS

Aircraft

1. The S2D (BUNO 149240), contains specially installed equipment and wing-mounted pods for cloud physics research. Also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.
2. The EC-121-K (BUNO 128324), used strictly for wave propagation studies in the four-frequency radar system.
3. The EC-121-K (BUNO 135753), used for research in cloud physics, navigation, low-frequency radar, and other projects requiring only minimal aircraft conversion.
4. The EC-121-K (BUNO 141297), used for radar, VLF propagation studies and OMEGA navigation systems. Equipment may be installed for other projects requiring only a small space.

Available Ships

1. USNS MIZAR (T-AGOR-11), scheduled by NRL.
2. USNS GIBBS (T-AGOR-1), scheduled by NRL.
3. USNS GILLISS (T-AGOR-4), USNS SANDS (T-AGOR-6), and USNS LYNCH (T-AGOR-7). Each under operational control of MSTSLANT for utilization East Coast Navy Labs with direction of NAVOCEANO; schedules prepared by NAVOCEANO.
4. USNS MISSION CAPISTRANO (T-AG-162), under operational control of MSTSLANT for use in ONR-supported Project Artemis. Former tanker modified to accommodate a high-powered sonar transducer, approximately five stories high and weighing hundreds of tons, which is lowered through center well.
5. SSX-1, used mainly for oceanographic research; scheduled by NRL.
6. Other surface vessels and submarines occasionally scheduled for NRL use by OPTEVFOR.

THE NAVY'S CORPORATE LABORATORY

The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that advancements in science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences, in advanced engineering, and in naval analysis. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in radio wave propagation, oceanography, deep-sea instrumentation, submarine air purification, structural design theory, fracture mechanics, surface chemistry, optical physics, radar, underwater sound propagation, acoustic signal processing, sonar transducers, nuclear physics, radio astronomy, high-temperature lubricants, high-energy fuels, plasma physics, refractory metals, exotic materials for high-performance structures, x-ray astronomy, high-power lasers, solid-state physics, and stress-corrosion cracking of high-strength titanium steels and aluminum alloys. The NRL FY 1970 Program Budget is \$91 million.

Some 1100 scientific and technical papers were produced in 1968 as a consequence of the research and development effort of the Laboratory staff. The figure includes 171 formal reports, 95 memorandum reports, 362 articles published in professional society journals, and 490 papers presented at scientific and technical meetings in the United States and in foreign countries (e.g., Austria, Belgium, England, Canada, Czechoslovakia, France, Japan, Switzerland, and Russia).

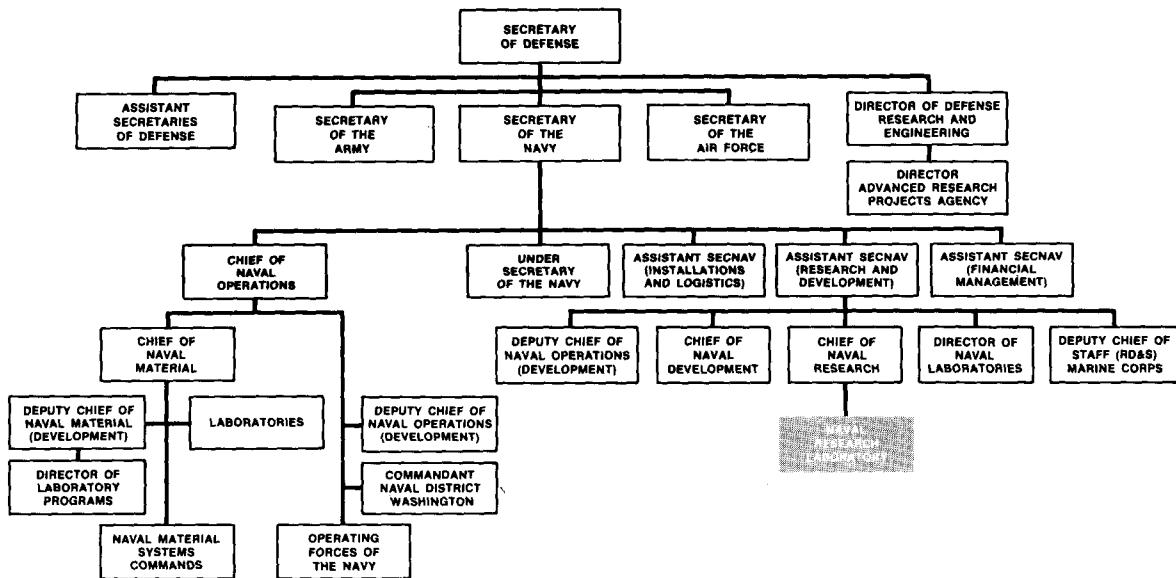
In addition, 71 U.S. Patents were issued in 1968 on inventions made by present and former employees of the Naval Research Laboratory. This figure brings the grand total of NRL patents, through the calendar year 1968, to 2110.

In its investigations of broad scientific areas, in considering its findings for potential military applications, and in furnishing to the Naval Systems Commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. Thus it provides a central focus of research and development activity that supports the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the Army, the Air Force, the Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.

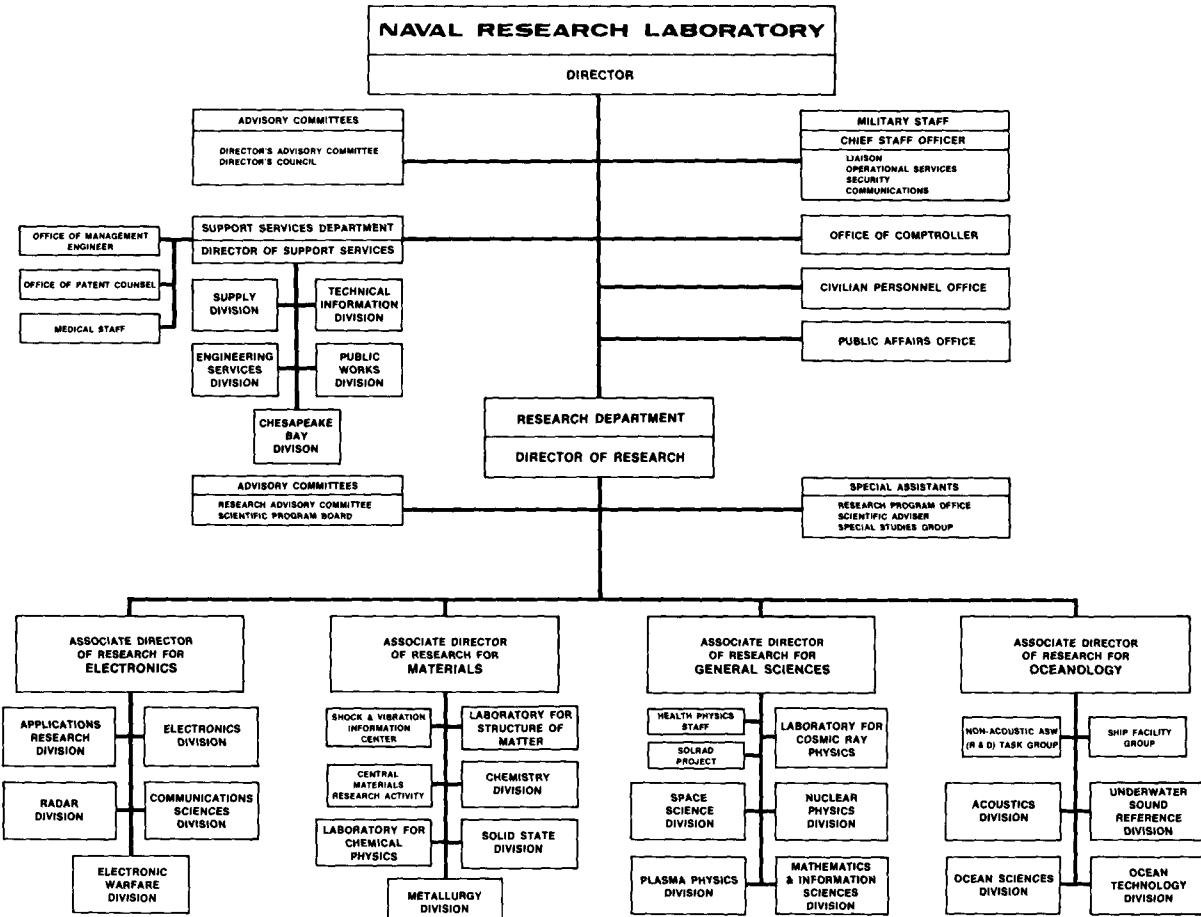
MISSION

The mission of the Naval Research Laboratory is to conduct scientific research and development in the physical sciences and related fields directed toward new and improved materials, equipment, techniques, and systems for the Navy. In fulfillment of this mission, the Naval Research Laboratory:

1. Initiates and conducts scientific research and development of a basic and long-range nature in scientific areas of special interest to the Navy.
2. Performs scientific research and development for the Systems Commands and offices of the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.
3. Provides to the Navy and its contractors standardized techniques and procedures for measurements and for the accurate calibration of standard instruments in areas of special Navy needs.
4. Furnishes scientific consultative services for the Navy and, where specially qualified, for the Defense Department and, in defense related efforts, for other government agencies.
5. Provides to the Navy unbiased determination of performance characteristics of developmental and prototype devices through limited engineering test and evaluation services.



Position of NRL in the Department of Defense structure



Organization chart of NRL

FISCAL INFORMATION

NRL FUNDING BY MAJOR SPONSOR FISCAL YEARS 1968-1970

Sponsor	FY 1968 (Act)		FY 1969 (Est)		FY 1970 (Est)	
	Millions of Dollars	Percent	Millions of Dollars	Percent	Millions of Dollars	Percent
R&D PROGRAM						
ONR	28.7	30.7	29.9	31.1	34.4	36.2
SHIP	13.0	13.9	14.2	14.8	13.4	14.1
ELEX	5.1	5.5	5.7	5.9	4.9	5.2
AIR	15.7	16.8	13.0	13.5	13.8	14.5
ORD	0.5	0.6	0.5	0.5	0.5	0.5
OTHER NAVY	1.7	1.8	5.0	5.2	1.5	1.6
TOTAL NAVY	64.7	69.3	68.3	71.0	68.5	72.1
OTHER DOD	14.6	15.6	15.0	15.6	14.6	15.4
NON-DOD	11.2	12.0	9.8	10.2	7.9	8.3
TOTAL R&D	90.5	96.9	93.1	96.8	91.0	95.8
NON R&D	1.4	1.5	1.6	1.7	1.6	1.7
TOTAL NIF	91.9	98.4	94.7	98.5	92.6	97.5
CAPITAL IMPROVEMENT	1.5	1.6	1.4	1.5	2.4	2.5
TOTAL FUNDS	93.4	100.0	96.1	100.0	95.0	100.0

OPERATING COSTS (Excluding Plant Account Funds) FY 1968-1969

<u>Purpose</u>	<u>During FY 1968</u>	<u>During FY 1969</u>
Materials, supplies and parts	\$10,613,462	\$11,095,000
Salaries and wages	41,311,312	44,614,700
Contractual services and other costs	38,378,841	41,382,500
TOTAL	\$90,303,615	\$97,092,200

CAPITAL PROPERTY

As of December 31, 1968

Class 1 (Land)	\$ 445,809
Class 2 (Buildings and improvements)	66,455,621
Class 3 (Equipment)	13,218,540
Class 4 (Industrial production equipment)	9,318,483
TOTAL CAPITAL PROPERTY	\$89,438,453

MILITARY AND CIVILIAN PERSONNEL

Military Personnel Attached to NRL as of December 31, 1968

<i>Officers</i>	<i>Authorized</i>	<i>On Board</i>
Captain	3	3
Commander	8	7
Lieutenant Commander	9	3
Lieutenant	6	7
Lieutenant (Junior Grade)	0	3
Ensign	0	1
Warrant Officer	1	0
Lieutenant Colonel, USMC	1	1
Captain, USAF	1	1
Total	29	26
<i>Enlisted</i>	66	62

Civilian Employees on Rolls as of December 31, 1968

10 USC 1581 (formerly Public Law 313)	22
Classification Act (GS)	2638
Scientific & Professional	1242
Technical Supporting	659
General Administrative & Clerical	737
Wage Board	894
General Wage Service (WB)	724
Apprentices, Planning, Estimating, etc. (WD)	69
Printing & Lithographic Service (WI)	17
Supervisory General Wage Service (WS)	75
Inspection Service (WX)	8
Leader (WL)	1
Total	3554

Annual Civilian Turnover Rate (percent)

	<u>1966</u>	<u>1967</u>	<u>1968</u>
Research Department	8.6	9.2	13.7
Nonresearch Areas	14.9	15.5	19.9
Entire Laboratory	11.7	12.3	16.8

Highest Academic Degrees Held by Permanent Employees as of December 31, 1968

Bachelors	731
Masters	297
Doctors	279

AWARDS RECEIVED BY CIVILIAN EMPLOYEES
As of December 31, 1968

<u>Government Awards</u>	<u>Number</u>
The Medal of Merit from the President of the United States	1
The Certificate of Merit from the President of the United States	11
The President's Award for Distinguished Federal Civilian Service	2
Department of Defense Distinguished Civilian Service Award	4
Department of Defense Certificate of Merit	1
Department of the Navy Award for Distinguished Achievement in Science	2
Navy Distinguished Civilian Service Award	51
Navy Captain Robert Dexter Conrad Award	3
Navy Superior Civilian Service Award (established 1959)	24
Navy Meritorious Civilian Service Award	186
E. O. Hulbert Annual Science Award (local NRL award)	13
<u>Non-Government Awards</u>	
Henry Draper Medal of the National Academy of Sciences	1
Engineering Science Award of the Washington Academy of Sciences	2
Physical Sciences Award of the Washington Academy of Sciences	4
Morris Liebmann Memorial Prize of the Institute of Radio Engineers	1
Medal of Merit Award of the Institute of Radio Engineers	2
Harry Diamond Award of the Institute of Radio Engineers	4
John Scott Medal of the City of Philadelphia	1
Patrons Award of the Institute of Radio Engineers (Washington section)	1
Reliability and Quality Control Award of the Radio Engineers Professional Group	1
Frederic Ives Award of the Optical Society of America	2
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
John A. Penton Gold Medal Award of the American Foundrymen's Society	1
Burgess Prize Award of the American Society for Metals	2
Charles B. Dudley Medal of the American Society for Testing Materials	1
Gold Medal Award of the American Society of Naval Engineers	1

<u>Non-Government Awards (Continued)</u>	<u>Number</u>
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	1
A. K. Doolittle Award of the National American Chemical Society	1
Kendall Company Award of the American Chemical Society	1
Hillebrand Prize of the American Chemical Society	1
William Blum Award of the Washington-Baltimore Electrochemical Society	1
National Award of the American Society of Lubrication Engineers	1
Annual Award of the Society for Applied Spectroscopy	2
E. Edward Pendray Award of the American Rocket Society	1
James H. Wyld Memorial Award of the American Rocket Society	1
Space Science Award of the American Institute of Aeronautics and Astronautics	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	1
Janssen Medal of the French Photographic Society	1
Ancel Prize of the French Photographic Society	1
Progress Award of the Photographic Society of America	1
Professional Achievement Award of the D. C. Council of Engineers and Architectural Studies	1
National Capital Award of the D. C. Council of Engineers and Architectural Studies	3
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Service to Mankind Award of the Washington Sertoma Club	1
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	1
Pure Science Award of the Scientific Research Society of America (NRL Branch)	14
Applied Science Award of the Scientific Research Society of America (NRL Branch)	14
Arthur S. Fleming Award of the Washington Chamber of Commerce	1
Society of Women Engineers Achievement Award	1
Notre Dame Centennial of Science Award	2
M. Barry Carlton Award - Institute of Electrical and Electronics Engineers	1
National Civil Service League Merit Citation	1

Part 2
Office of the Director

JAMES C. MATHESON

CAPTAIN, USN

Captain Matheson [REDACTED], in [REDACTED]. He attended the University of Chicago from 1939 to 1941 and was graduated from the United States Naval Academy in 1944. He holds degrees in naval architecture and nuclear engineering from the Massachusetts Institute of Technology and has completed the Advanced Management Program at the Harvard School of Business Administration.

Captain Matheson is an Engineering Duty Officer. He is qualified in submarines and served aboard the DACE in the Pacific during World War II and the MEDREGAL in the Atlantic subsequent to the war. He has held positions at the Portsmouth Naval Shipyard, at the Bureau of Ships, and with the Atomic Energy Commission as Chief of the West Milton Site of the Knolls Atomic Power Laboratory. From 1961 to 1965 he served as the Nuclear Power Superintendent at the Mare Island Naval Shipyard. He reported to the Naval Research Laboratory as Director of Support Services in October 1965 and assumed the position of Director of the Laboratory on May 29, 1967.

He is a member of the Society of Naval Engineers, the Research Society of America, and the Philosophical Society of Washington.

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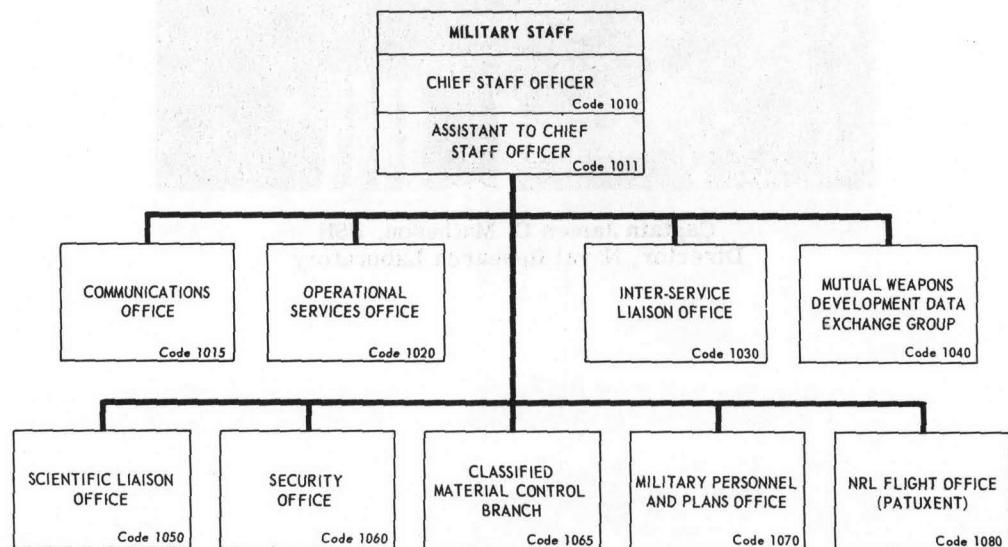
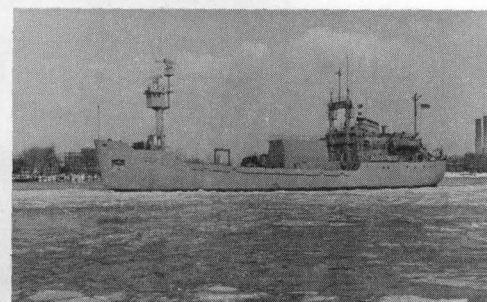
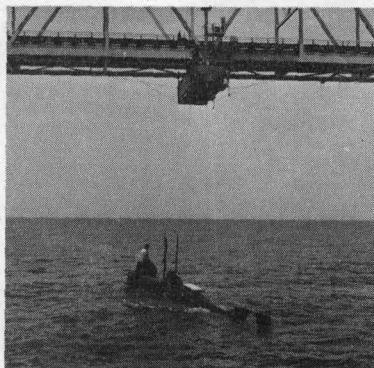
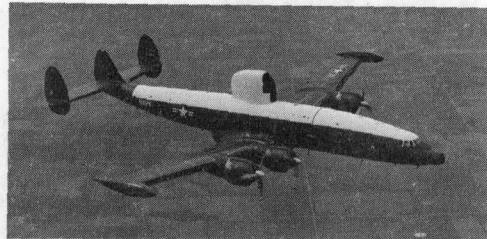
**Captain James C. Matheson, USN
Director, Naval Research Laboratory**



Military Staff Office

CAPT R. M. Davis, USN

- MILITARY PERSONNEL
- MILITARY PLANS
- MUTUAL WEAPONS DEVELOPMENT DATA EXCHANGE
- OPERATIONAL SERVICES
- INTERSERVICE LIAISON
- SCIENTIFIC LIAISON
- SECURITY
- COMMUNICATIONS



Basic Responsibilities

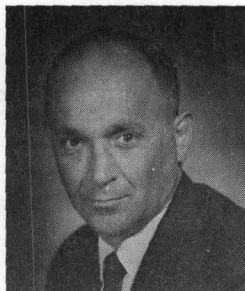
The Military Staff maintains liaison with the systems commands and offices of the Navy Department, with other units of the Naval establishment ashore and afloat, and with other governmental and nongovernmental agencies concerned with the coordination of military application of the scientific work of the Laboratory. It supports five multi-engine Laboratory aircraft and obtains and coordinates such additional air, surface, and subsurface services as are required. The Military Staff is also responsible for personnel and plant security, communications, and control of classified material.

Key Personnel

<i>Name</i>	<i>Title</i>
CAPT R. M. Davis, USN	Chief Staff Officer
CDR M. M. Gibson, USN	Assistant to the Chief Staff Officer
ENS W. R. Allen, USNR	Communications Officer
CDR A. V. McPhillips, USNR	Operational Services Officer
LTCOL P. P. Pirhalla, USMC	Marine Corps Liaison Officer
CAPT J. R. Wade, USAF	Air Force Systems Command Liaison Officer
Mr. F. W. Shannon	Head, Mutual Weapons Development Data Exchange Group
CDR M. R. Kalnitzky, USN	Scientific Liaison Officer
Mr. C. J. Dryer	Head, Security Branch
Mr. J. J. Bagley	Classified Material Control Officer
LT N. K. Matheson, USN	Military Personnel and Plans Officer
LCDR F. C. Nelson, USN	Head, NRL Flight Office (Patuxent)

Personnel Complement

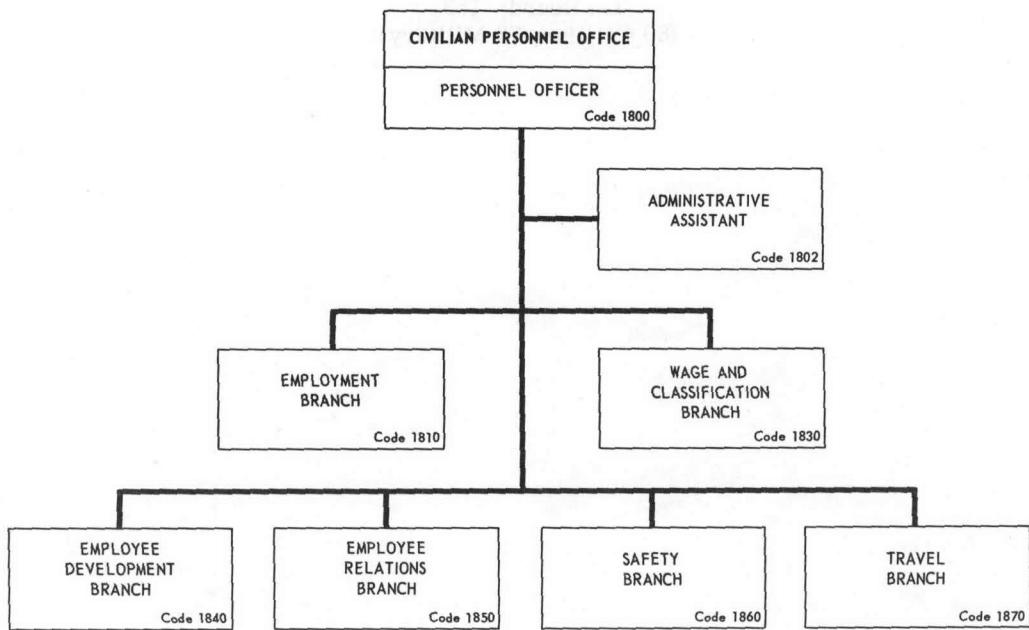
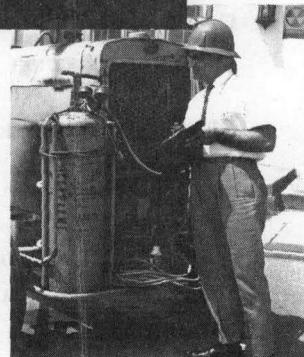
On Board: 153
(80 Civilian, 73 Military)



Mr. A. G. Gross

Civilian Personnel Office

- EMPLOYMENT
- WAGE AND CLASSIFICATION
- EMPLOYEE DEVELOPMENT
- EMPLOYEE RELATIONS
- SAFETY
- TRAVEL



Basic Responsibilities

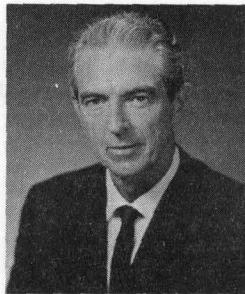
The Civilian Personnel Office administers the Laboratory's personnel program, which provides for the selection, development, promotion, utilization, appropriate recognition, travel, and safety of all civilian personnel. It is also responsible for the establishment and review of all Classification Act and ungraded positions.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. A. G. Gross	Personnel Officer
Mr. J. E. Goss	Head, Employment Branch
Mr. K. R. Harper	Head, Wage and Classification Branch
Mr. W. J. McLaughlin	Head, Employee Development Branch
Mr. H. H. Kay	Head, Employee Relations Branch
Dr. R. G. Nebelung	Head, Safety Branch
Mrs. B. E. Michaud	Head, Travel Branch

Personnel Complement

On Board: 56



Mr. J. P. Donovan

Office of the Comptroller



COMPUTER

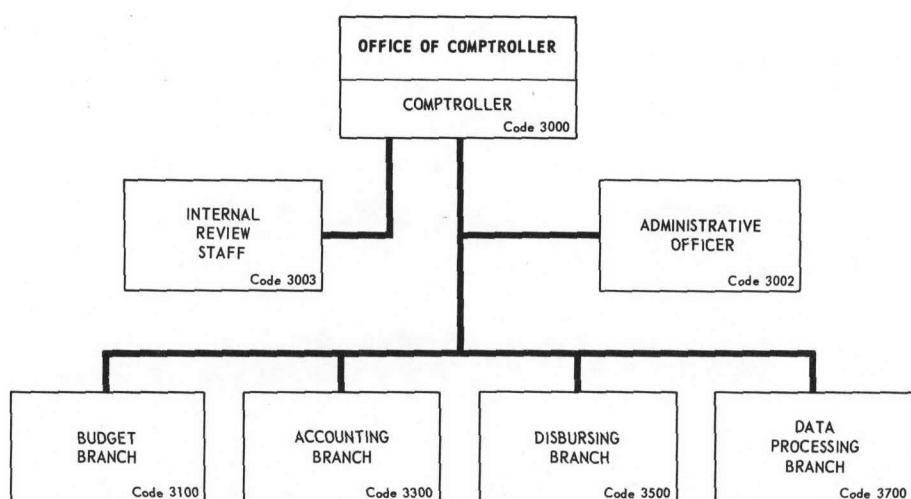


DISBURSING

DISBURSING



- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



Basic Responsibilities

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers the financial program of the Laboratory.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. J. P. Donovan	Comptroller
Mr. W. S. Slater	Budget Officer
Mr. R. A. Showman	Accounting Officer
LTJG C. R. Grant, SC, USNR	Disbursing Officer
Mr. D. A. Staudt	Data Processing Officer
Mr. D. K. Jones	Head, Internal Review Staff

Personnel Complement

On Board: 79

Part 3

The Research Department



Dr. Alan Berman
Director of Research

Dr. Berman [REDACTED] [REDACTED] He received the A.B. degree in physics from Columbia College in 1947 and the Ph.D. degree in physics from Columbia University in 1952.

From 1952 to 1955 he was a research scientist at the Hudson Laboratories of Columbia University. He became Assistant Director of Hudson Laboratories in 1955, Associate Director in 1957, and Director in 1963. On May 29, 1967, Dr. Berman became Director of Research for the Naval Research Laboratory.

Dr. Berman's research specialties include the areas of underwater acoustics, oceanography, and signal processing. He has published numerous papers on these and related subjects. At present he is a member or chairman of a wide variety of Navy and oceanographic advisory groups. He also provides advisory services for a number of Department of Defense and other Government agencies.

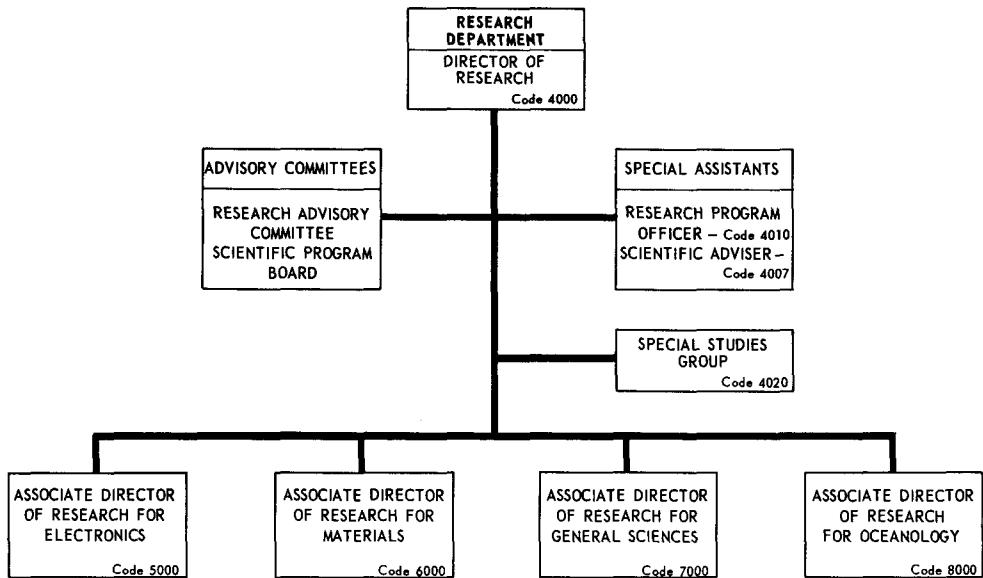
Dr. Berman has on three occasions been visiting scientist to the Admiralty Research Laboratory, Teddington, England (1955, 1957, 1960), and once at the SACLANT ASW Research Center, La Spezia, Italy (1960).

THE RESEARCH DEPARTMENT

The Research Department is headed by a distinguished civilian scientist and administrator. The research effort is divided into four major fields—electronics, materials, general sciences, and oceanology—which correspond to the principal areas of the Navy's interest in the physical and engineering sciences. There is an associate director of research for each of these four broad areas. Sixteen scientific divisions, each headed by a civilian scientist, pursue work in specific fields. Branches within these divisions form interrelated working units.

Key Personnel

<u>Name</u>	<u>Title</u>	<u>Code</u>
Dr. A. Berman	Director of Research	4000
Dr. P. Waterman	Special Assistant	4008
Mr. A. Hollings	Research Program Office	4010
Mr. C. L. Tipton	Special Studies Group	4020
Dr. C. E. Cleeton	Associate Director of Research for Electronics	5000
Dr. J. H. Schulman	Associate Director of Research for Materials	6000
Dr. W. C. Hall	Associate Director of Research for General Sciences	7000
Dr. R. R. Goodman	Associate Director of Research for Oceanology	8000



RESEARCH PROGRAM OFFICE

Basic Responsibilities

The Research Program Office serves as staff to the research directorate of the Laboratory. It provides an orderly plan for coordinating NRL research programs with those of ONR and other sponsors or potential sponsors throughout the Departments of the Navy, the Army, and the Air Force, the Advanced Research Projects Agency, and other agencies of the government. It also serves as a focal point for program information for project managers and other key personnel of sponsoring activities on work in progress or in various stages of planning. The Research Program Office maintains a management information center which serves as a working tool for the Laboratory directorate, and it maintains appropriate records of the Laboratory's research programs.

Key Personnel

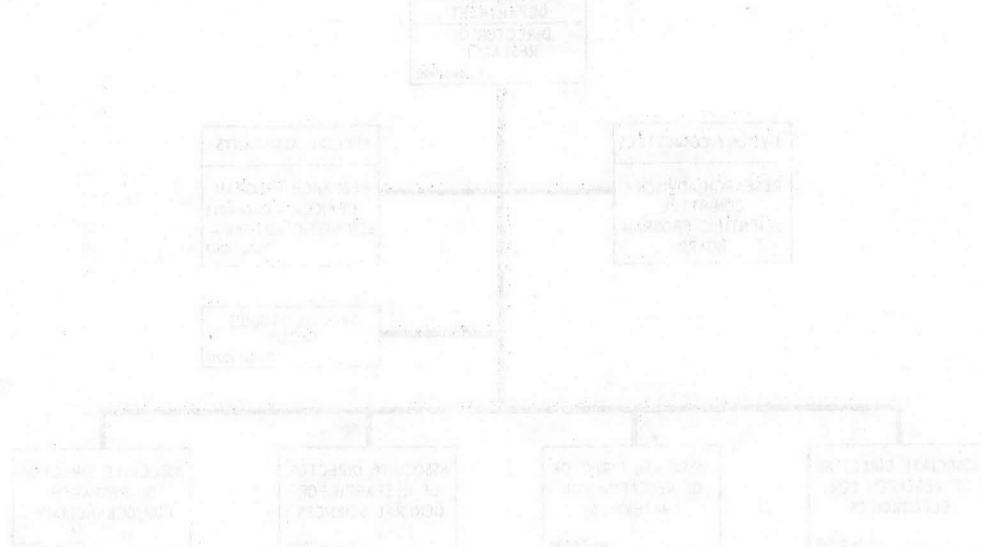
Name	Title
Mr. A. J. Hollings	Head, Research Program Office
Mr. R. E. Seibold	Deputy Head, Research Program Office
Mr. R. C. Spragg	Head, Management Information Center Section
Mr. R. E. Seibold	Head, Short-Range Program Planning and Appraisal Section
Dr. L. N. Morscher	Staff Assistant—Requirements



Mr. A. J. Hollings

Personnel Complement

On Board: 9



SPECIAL STUDIES GROUP

Basic Responsibilities

The Special Studies Group was designed to provide analytical staff support to the Director of Research in the fields of strategic, tactical, and special naval warfare. Programs of operation research and system analysis are undertaken to provide substantive analytical bases for (a) the orientation of naval research and development, and (b) the general delineation of advanced naval weapon systems and force structures requirements for the mid- to long-range time period. Broad scope analyses of projected threats, operations, tactics, equipments, and forces are conducted by four study units—Operations Analysis, Systems Analysis, Systems Applications, and Amphibious Warfare.

Key Personnel

Name	Title
Mr. C. L. Tipton	Head, Special Studies Group

Personnel Complement

On Board: 8

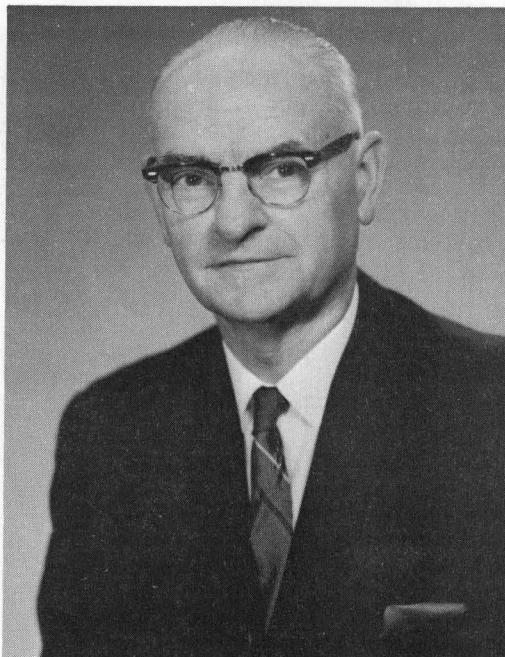
Total Estimated R&D Funding

Fiscal Year 1969: \$970,000



Mr. C. L. Tipton

Electronics Area



Dr. Claud E. Cleeton
Associate Director of Research for Electronics

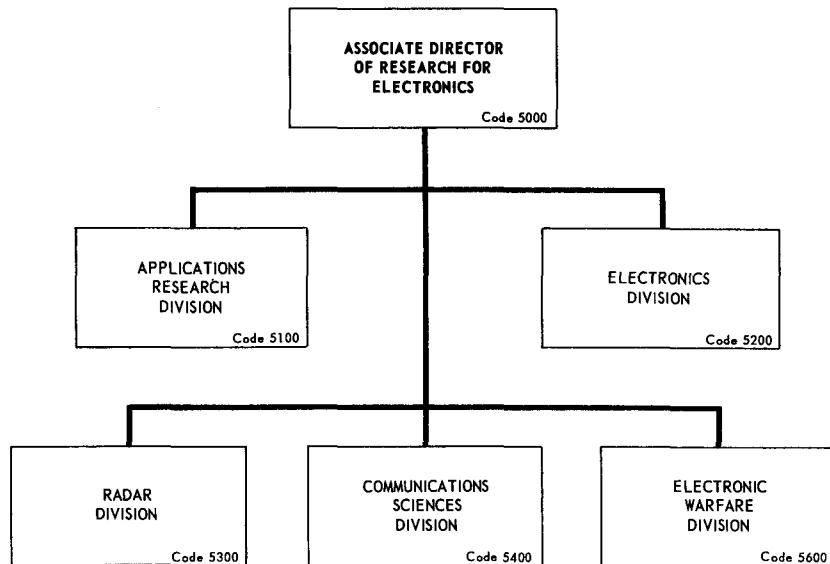
Dr. Cleeton [REDACTED]. He received the B.S. degree from Missouri State Teachers College in 1928, the M.A. degree from the University of Missouri in 1930, and the Ph.D. in physics from the University of Michigan in 1935. His Ph.D. thesis has become a classical paper in the annals of microwave spectroscopy.

Before joining NRL's Radio Division in 1936, he taught physics and mathematics at Northeast Missouri State College, Moberly Junior College, and the University of Michigan. His first five years at the Laboratory were devoted to pioneer research in microwave communications and digital electronic circuits. He then directed his efforts to electronic identification systems, radio control, and guided missile electronics.

In 1942 Dr. Cleeton was named Technical Head of the Combined Research Group, which consisted of approximately 300 British, Canadian, and American scientists stationed at NRL and entrusted with the development of a uniform radar identification and recognition system for the Allied military forces. For his efforts he was awarded the President's Certificate of Merit (1946) and the Meritorious Civilian Service Award (1947).

In 1946 Dr. Cleeton was named head of NRL's Security Systems Branch, where he directed research and development of identification and radar beacon systems for use by all the service branches. He was appointed Superintendent of Radio Division I in 1952 and Superintendent of the Applications Research Division in 1954. For the next six years he was responsible for data processing, display of information collected by radar, organization of combat information centers, man-machine systems, and associated digital devices for computing and data transfer. His division was also responsible for the detailed technical direction of the research, development, and operation of the Space Surveillance System, which is designed to detect, track, identify, and determine the orbits of nonradiating space objects. Dr. Cleeton was named Associate Director of Research for Electronics in January 1965.

Dr. Cleeton has been granted 13 patents, and two others are pending. He is also the author and co-author of several papers published in technical journals. He is a Fellow of the Institute of Electrical and Electronics Engineers and a member of the American Physical Society and Sigma Xi.



Key Personnel

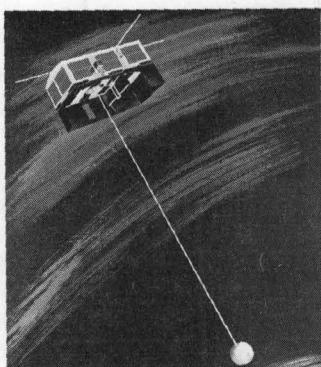
Dr. C. E. Cleeton	Associate Director of Research for Electronics
Mr. L. A. Gebhard	Consultant
Dr. W. R. Faust	Superintendent, Applications Research Division
Mr. A. Brodzinsky	Superintendent, Electronics Division
Dr. M. I. Skolnik	Superintendent, Radar Division
Dr. L. B. Wetzel	Superintendent, Communications Sciences Division
Mr. H. O. Lorenzen	Superintendent, Electronic Warfare Division



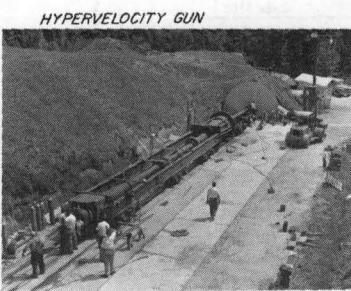
Dr. W. R. Faust

Applications Research Division

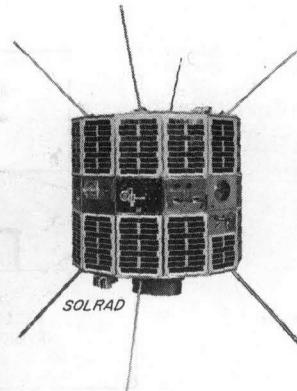
- APPLIED PHYSICS
- OPERATIONAL RESEARCH
- SPACE APPLICATIONS
- SATELLITE TECHNIQUES
- DYNAMICS



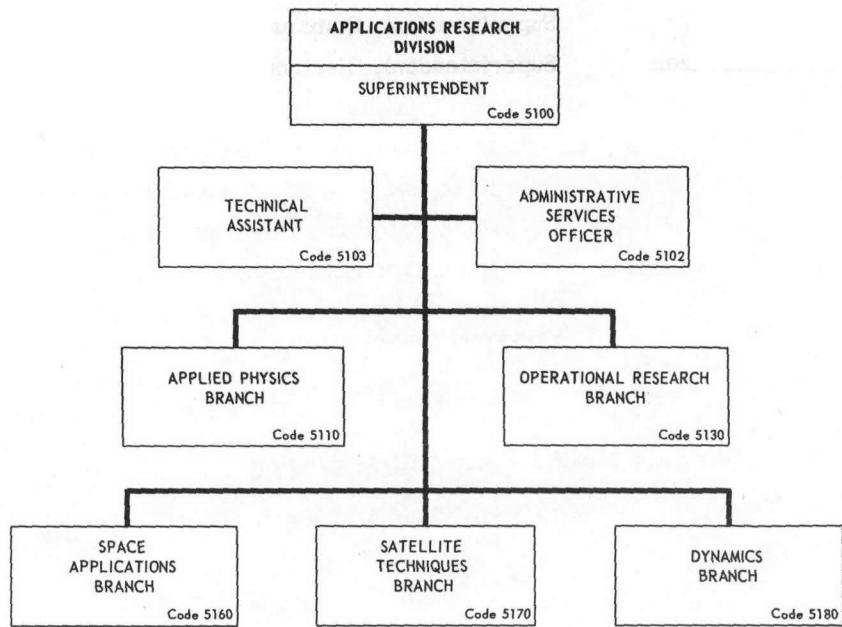
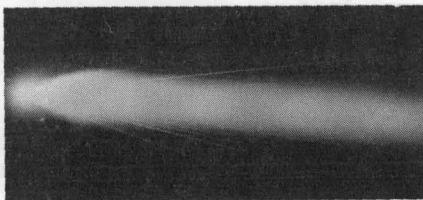
TIMEATION



HYPERVERLOCITY GUN



ROCKET
PLASMA
STUDIES



Basic Responsibilities

The Applications Research Division conducts research and development in the fields of plasma physics, the effects of nuclear weapons on naval systems, defense against ballistic missiles including impact and penetration ballistics, data handling and processing, satellite techniques, and celestial mechanics and navigation. As a result of these studies the Division designs and develops systems (e.g., satellites) and components (e.g., antennas for use in space) as related to such naval requirements as target identification, surveillance, navigation, guidance, and communication and provides for the evaluation of such systems.

Branches

Applied Physics

- Intercept control
- Data processing and display
- IFF display
- Lasers for target identification and surveillance
- Space and plasma physics and quantum electronics

Operational Research

- Orbit computation and celestial mechanics
- Fire and missile control evaluation instrumentation
- Satellite telemetry automatic data processing

Space Applications

- Navigation satellites
- Profile techniques

Satellite Techniques

- Satellite development
- Gravity gradient stabilization of satellites
- Research satellites, especially solar radiation devices
- Calibration satellites

Dynamics

- Vulnerability mechanics
- Hypervelocity kill mechanisms
- Hypervelocity impact mechanics
- Penetration into earthy materials

Key Personnel

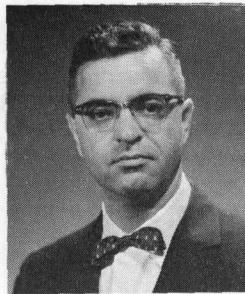
<i>Name</i>	<i>Title</i>
Dr. W. R. Faust	Superintendent
Mr. E. W. Peterkin	Technical Assistant to Superintendent
Dr. W. S. Ament	Consultant
Mr. E. F. Kulikowski	Head, Applied Physics Branch
Mr. C. H. Chrisman	Head, Operational Research Branch
Mr. R. L. Easton	Head, Space Applications Branch
Mr. P. G. Wilhelm	Head, Satellite Techniques Branch
Mr. W. W. Atkins	Head, Dynamics Branch

Personnel Complement

On Board: 168

Total Estimated R&D Funding

Fiscal Year 1969: \$9,200,000



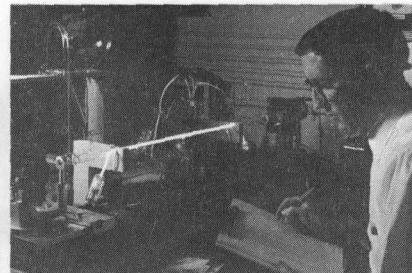
Mr. A. Brodzinsky

Electronics Division

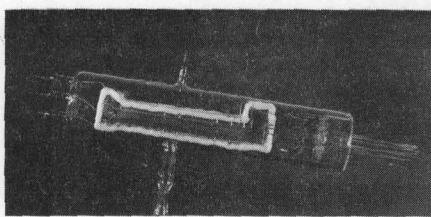
MICRO-CIRCUITRY



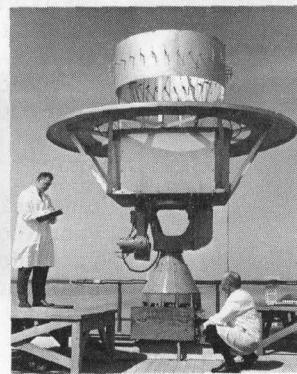
GAS LASERS



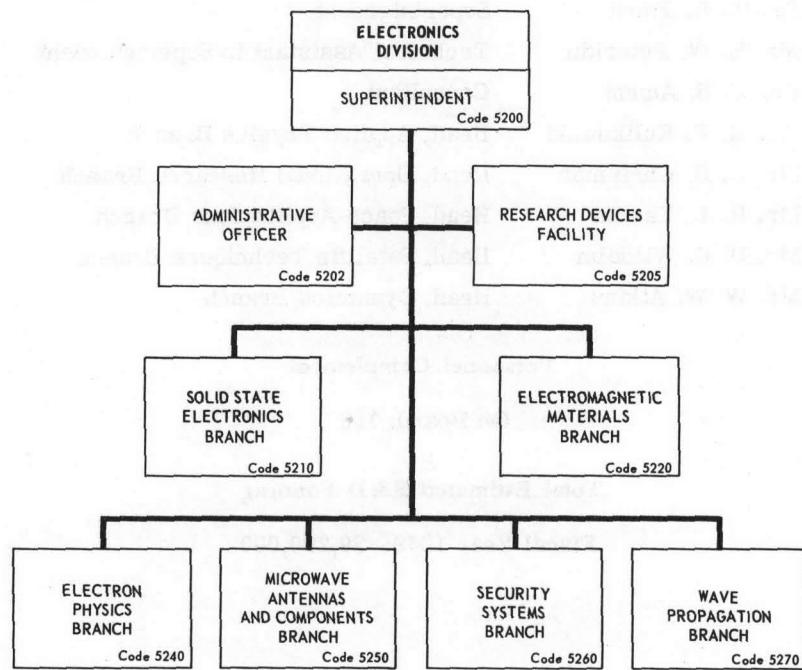
ELECTRON TUBE RESEARCH



ANTENNA RESEARCH



- SOLID STATE ELECTRONICS
- ELECTROMAGNETIC MATERIALS
- ELECTRON PHYSICS
- MICROWAVE ANTENNAS & COMPONENTS
- SECURITY SYSTEMS & NAVIGATION
- WAVE PROPAGATION



Basic Responsibilities

The Electronics Division carries out programs of basic and applied research and development in the fields of: electronic properties of solid materials; microwave antennas and components; microelectronic technology; electronic identification systems; electromagnetic wave propagation; properties of ground and sea surface radar returns; and vacuum and gaseous electron devices.

Branches

Solid State Electronics

Semiconductor devices, materials and circuits, both low and microwave frequencies
Thin films

Electromagnetic Materials

Electromagnetic wave scattering: (1) from rough liquid surfaces; (2) from small particles
Development and application of radar protective coatings
Systems for production, processing, and control of electric power
Seawater battery development and applications

Electron Physics

Gas lasers
Microwave tubes
Vacuum breakdown
Surface physics research
Night vision tubes

Microwave Antennas and Components

Millimeter wave communication system
Naval electronic scanning antennas for airborne use
Advanced microwave antenna research
Microwave electronic components

Security Systems

Development of new IFF systems and components
Development of solid state transmitters at L-band
Development of IFF decision devices
Consulting services to AIMS* tri-service program

Wave Propagation

Properties of ground and sea surface radar echoes
Radar mapping of terrain
Target cross section measurements
Sea surface analysis

*AIMS

A - Air Traffic Control Radar Beacon
I - IFF (Identification Friend or Foe)
M - Mark XII
S - System

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. A. Brodzinsky	Superintendent
Mr. T. E. Hanley	Head, Research Devices Facility
Mr. C. V. Parker	Head, Solid State Electronics Branch
Dr. R. W. Wright	Head, Electromagnetic Materials Branch
Dr. S. T. Smith	Head, Electron Physics Branch
Dr. A. E. Marston	Head, Microwave Antennas and Components Branch
Mr. G. E. Hart	Head, Security Systems Branch
Mr. N. W. Guinard	Head, Wave Propagation Branch

Personnel Complement

On Board: 139

Total Estimated R&D Funding

Fiscal Year 1969: \$4,251,000

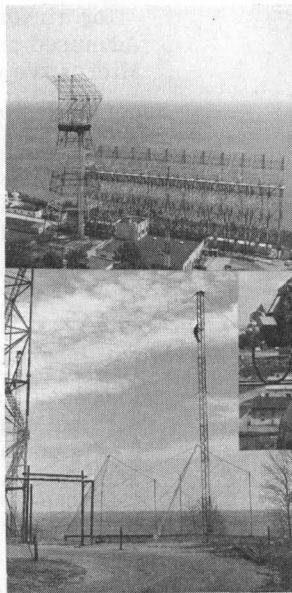


Dr. M. I. Skolnik

Radar Division

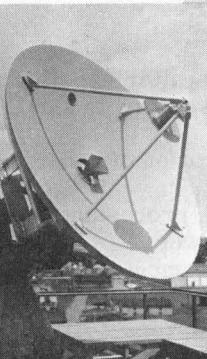
- RADAR TECHNIQUES
- SEARCH RADAR
- TARGET CHARACTERISTICS
- AEROSPACE RADAR
- EQUIPMENT RESEARCH
- RADAR GEOPHYSICS

HF ADVANCED RESEARCH RADAR

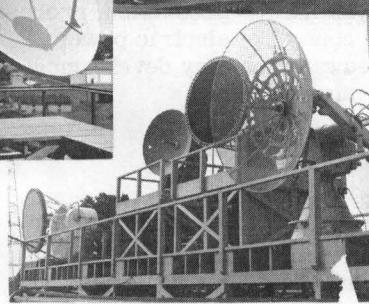
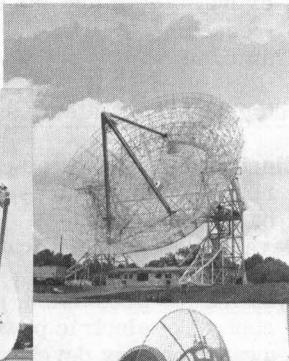


HF SURFACE WAVE ANTENNA

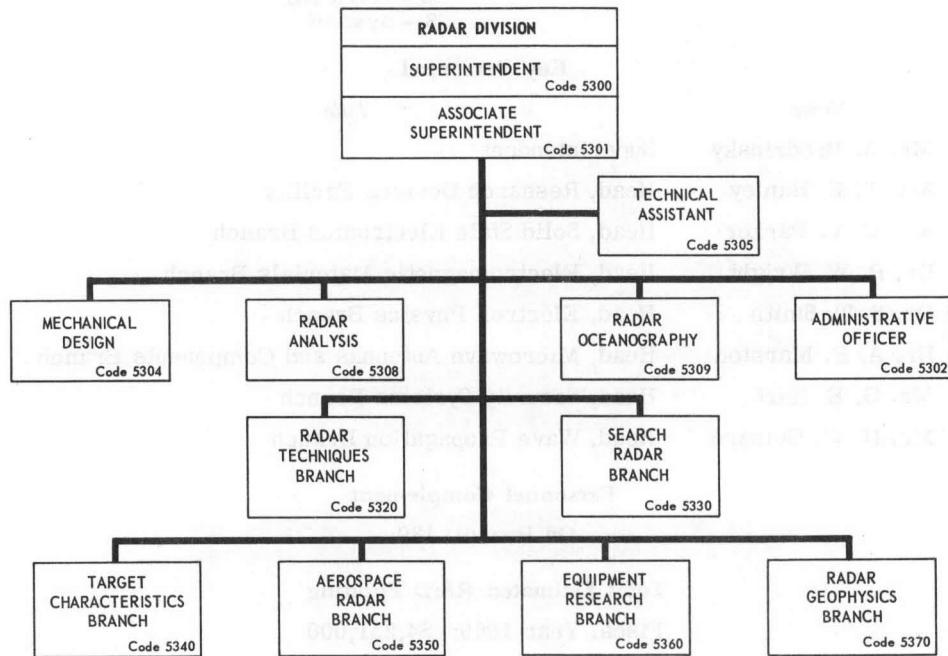
MARK 50
MONOPULSE RADAR



RANDLE CLIFF RADAR



MULTI-BAND EXPERIMENTAL
RADAR COMPLEX



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analysis and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors which are applicable to enhancing the Navy's ability to fulfill its mission.

Branches

Radar Techniques

High-frequency radar
Signal processing

Search Radar

Phased array techniques
ASW radar
Precision tracking radar techniques
Radar evaluation
Range instrumentation

Target Characteristics

Target signature analysis
Target radar-spectra studies
Microwave and laser techniques
Laser sensor systems

Aerospace Radar

Ocean surveillance

Equipment Research

Airborne radar
Weapons analysis
ECCM
Airborne early warning radar
Moving target indication techniques for ship
and airborne radars

Radar Geophysics

Wave propagation
Studies of ionosphere by means of radar
and satellite transmissions
Radar measurements of satellites
and ballistic missiles

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. M. I. Skolnik	Superintendent
Mr. J. H. Dunn	Associate Superintendent
Mr. W. N. Shaddix	Technical Assistant
Mr. S. F. George	Radar Analysis Staff
Mr. I. W. Fuller, Jr.	Radar Oceanography Group
Mr. F. M. Gager	Head, Radar Techniques Branch
Dr. R. J. Adams	Head, Search Radar Branch
Mr. I. D. Olin	Head, Target Characteristics Branch
Mr. R. E. Ellis	Head, Aerospace Radar Branch
Mr. D. L. Ringwalt	Head, Equipment Research Branch
Mr. L. V. Blake	Head, Radar Geophysics Branch

Personnel Complement

On Board: 175

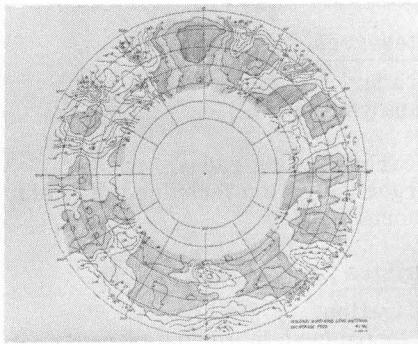
Total Estimated R&D Funding

Fiscal Year 1969: \$6,710,000



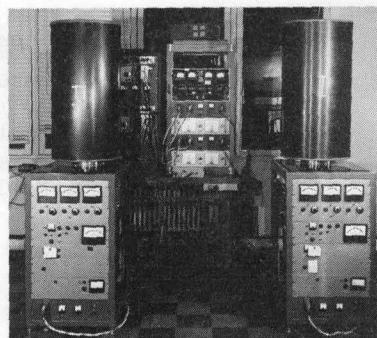
Dr. L. B. Wetzel

Communications Sciences Division

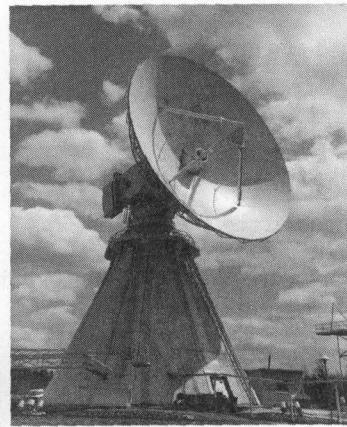


- RADIO COMMUNICATION SYSTEMS
- SYSTEMS INTEGRATION AND INSTRUMENTATION
- SATELLITE COMMUNICATION
- RADIO ANTENNA
- ELECTROMAGNETIC PROPAGATION

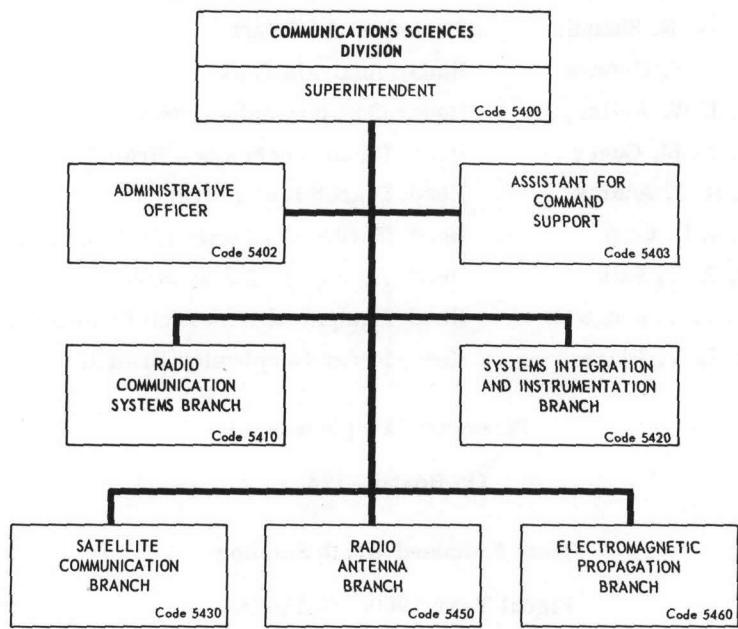
ANTENNA
PATTERN
MEASUREMENT



MICROWAVE SPACE
RESEARCH FACILITY



HYDROGEN MASER
TIME STANDARDS



Basic Responsibilities

The Communications Sciences Division conducts research and development in the fields of radio communication systems, satellite communications, integration of electronic systems, precise frequency and time, communication antennas, electromagnetic wave propagation and certain aspects of radio navigation.

Branches

Radio Communication Systems

Secure communications
Modem and interface functions
Crypto-logic systems
Terminal devices

Systems Integration and Instrumentation

Precise frequency and time
Centralized electronic control
Integrated communication, navigation
and identification systems
Long range aircraft navigation (OMEGA)
Advanced monitoring & testing techniques

Satellite Communication

Satellite communication systems
Precision satellite communication experiments
Modem studies
Orbit parameter studies

Radio Antenna

Communication antenna studies
Antenna circuitry
Underwater reception and propagation

Electromagnetic Propagation

ELF/VLF and LF propagation studies
Noise measurements and predictions
Microwave troposcatter
Effects of propagation on navigational accuracy

Key Personnel

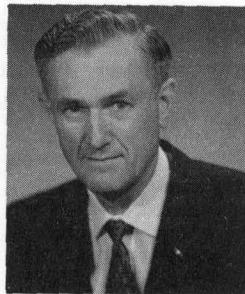
<i>Name</i>	<i>Title</i>
Dr. L. B. Wetzel	Superintendent
Mr. R. A. Tuttle	Assistant for Command Support
Mr. C. B. Davis	Head, Radio Communication Systems Branch
Mr. D. I. Himes	Head, Systems Integration and Instrumentation Branch
Mr. J. P. Leiphart	Head, Satellite Communication Branch
Mr. M. L. Musselman	Head, Radio Antenna Branch
Mr. W. E. Garner	Head, Electromagnetic Propagation Branch

Personnel Complement

On Board: 125

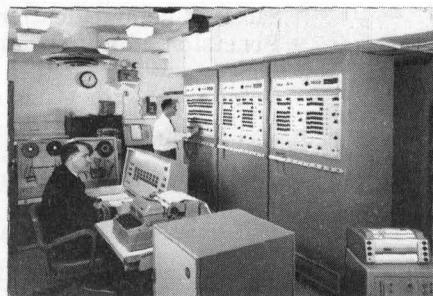
Total Estimated R&D Funding

Fiscal Year 1969: \$7,800,000



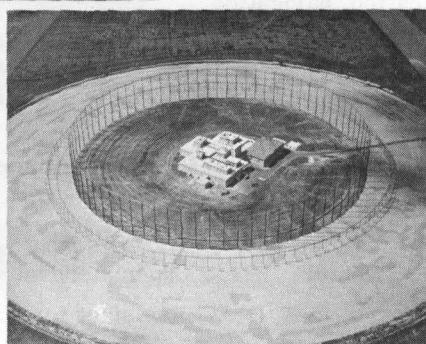
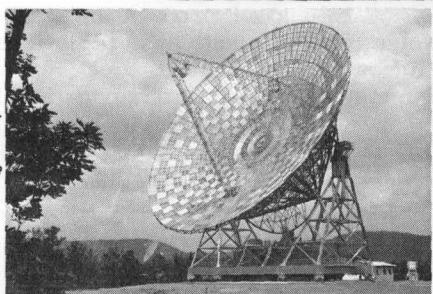
Mr. H. O. Lorenzen

TACTICAL DATA
PROCESSING

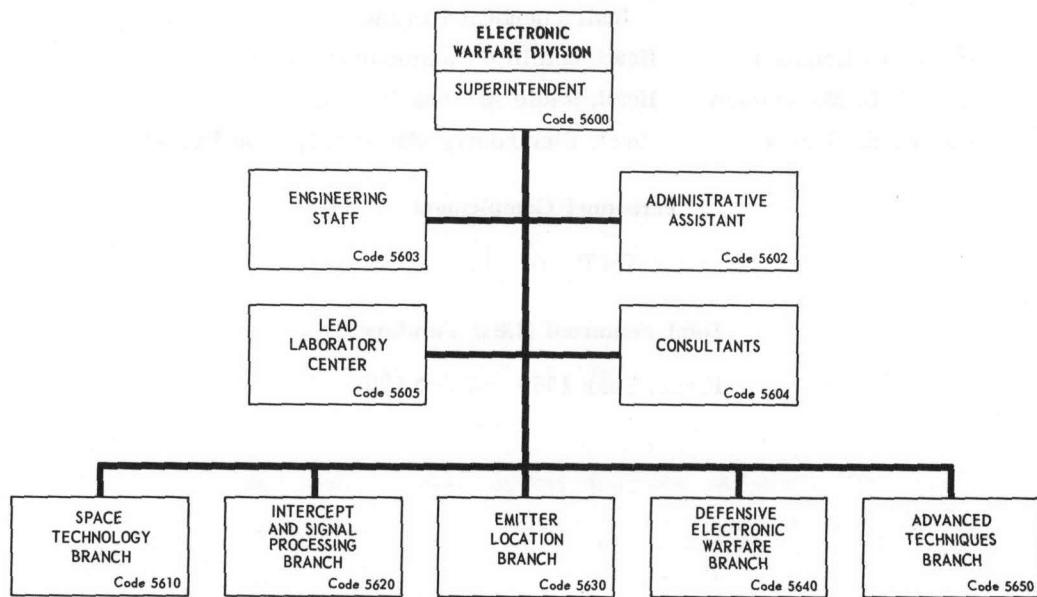


- LEAD LABORATORY/CENTER
- SPACE TECHNOLOGY
- SIGNAL INTERCEPT AND SIGNAL PROCESSING
- Emitter Location
- DEFENSIVE ELECTRONIC WARFARE
- ADVANCED TECHNIQUES

150 FOOT
ANTENNA
Sugar Grove



HF
ANTENNA



Basic Responsibilities

The Electronic Warfare Division is responsible for the research and development required in support of the Navy's electronic warfare mission in the fields of space technology, intercept and signal processing, emitter location, and defensive electronic warfare, and has responsibility associated with NRL's designation as Lead Laboratory for Navy in-house exploratory development.

Branches

Space Technology

- Large parabolic antenna systems
- Electromagnetic radiation observation
- Special media propagation
- Electromagnetic exosphere phenomena
- Satellite systems
- National radio quiet zone

Emitter Locations

- Direction finding
- Ionospheric research
- Propagation studies
- Infrared countermeasures
- Large antenna studies

Intercept and Signal Processing

- Interception
- Signal processing
- Data storage
- Data processing
- Recording
- Display

Defensive Electronic Warfare

- Deception techniques
- Jamming
- Electromagnetic reflectors
- Defensive systems

Lead Laboratory Staff

- Navy in-house exploratory development
- Program Reference Center
- Technical studies analysis and consultation
- Advanced Technical Objectives Work Group

Advanced Techniques

- Concept formulation
- New platform and mission considerations
- Signal processing devices
- Advanced detection and identification techniques
- New ECM techniques

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. H. O. Lorenzen	Superintendent
CAPT F. Welden, USN (Ret)	Consultant
Mr. W. E. Withrow	Consultant
Dr. G. P. Ohman	Lead Laboratory Coordinator and Head, Lead Laboratory Staff
Mr. J. H. Trexler	Head, Space Technology Branch
Mr. R. D. Misner	Head, Intercept and Signal Processing Branch (Acting)
Mr. M. J. Sheets	Head, Emitter Location Branch
Mr. A. J. Jesswein, Jr.	Head, Defensive Electronic Warfare Branch (Acting)
Mr. L. A. Cosby	Head, Advanced Techniques Branch

Personnel Complement

On Board: 118

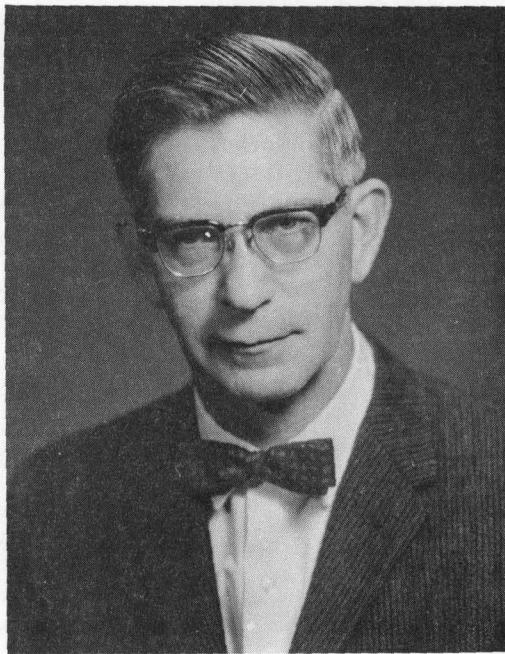
Graded: 117

Ungraded: 1

Total Estimated R&D Funding

Fiscal Year 1969: \$12,000,000

Materials Area



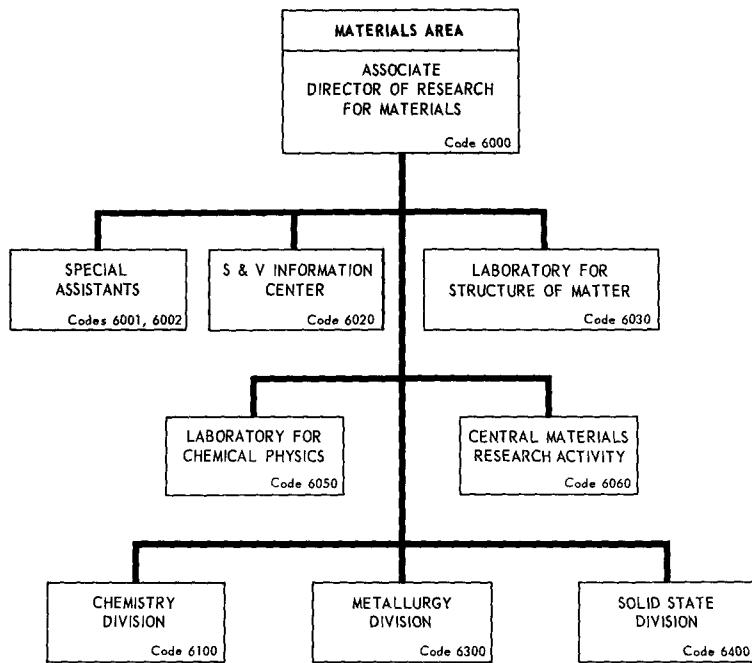
Dr. James H. Schulman
Associate Director of Research for Materials

Dr. Schulman [REDACTED] He is a graduate of the Massachusetts Institute of Technology, from which he received the B.S. degree in 1939 and the Ph.D. degree in 1942, both in the field of chemistry. While working toward his doctorate he held an instructorship at Suffolk, Boston, and a Teaching Fellowship at M.I.T. In 1941, he joined the staff of the M.I.T. Laboratory for Insulation Research, where he headed a section concerned with selenium rectifiers and photocells.

Dr. Schulman joined the Sylvania research laboratories in 1944 to carry out research on luminescent materials for use in cathode-ray tubes and fluorescent lamps. He came to NRL in 1946 to initiate a research program on luminescence, with particular emphasis on inorganic luminescent materials. At NRL he has served as Head, Chemical Metallurgy Branch, Metallurgy Division; Head, Dielectrics Branch, Solid State Division; Acting Associate Superintendent, Solid State Division; and Superintendent of the former Optical Physics Division. From August 1960 until December 1961, he was Deputy Scientific Director and Liaison Scientist for Solid State Physics with the London Branch of the Office of Naval Research. Upon his return to NRL in November 1964, Dr. Schulman was appointed to the Chair of Materials Sciences in recognition of his distinguished research accomplishments. In September 1967, he was appointed Associate Director of Research for Materials.

Dr. Schulman received the Applied Science Award of the NRL Branch of the Research Society of America (1957) and the Navy Superior Civilian Service Award (1965), both in recognition of his many contributions to the study of solid luminescent materials and phenomena, the investigation of radiation-induced optical effects in solids, and the application of the radiation-sensitive properties of solids to the dosimetry of nuclear and other high-energy radiations.

Dr. Schulman is a member of the Steering Committee of the Solid State Panel of the National Academy of Sciences, a former member of the Visiting Committee of the Argonne National Laboratory, and a former Chairman of the National Academy of Sciences-National Research Council Committee on High-Level Radiation Dosimetry. He is an Associate Editor of the Journal of the Optical Society of America and of the Materials Research Bulletin. Dr. Schulman is a Fellow of the American Physical Society, of the Optical Society of America, and of the American Association for the Advancement of Science. He has written numerous technical papers, coauthored a book in a special area of solid state physics, and been awarded several patents.



Key Personnel

Dr. J. H. Schulman	Associate Director of Research for Materials
Dr. D. A. Patterson	Special Assistant
Dr. H. Gandy	Special Assistant
Dr. W. W. Mutch	Head, S&V Information Center
Dr. J. Karle	Head, Laboratory for Structure of Matter
Dr. R. L. Tuve	Consultant
Dr. W. A. Zisman	Head, Laboratory for Chemical Physics
Mr. R. J. Ginther	Head, Central Materials Research Activity
Dr. R. E. Kagarise	Superintendent, Chemistry Division
Mr. W. S. Pellini	Superintendent, Metallurgy Division
Dr. C. C. Klick	Superintendent, Solid State Division (Acting)

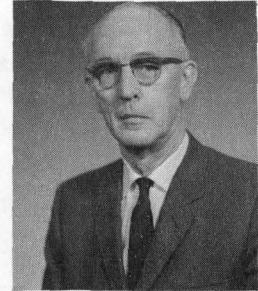
SHOCK & VIBRATION INFORMATION CENTER

Basic Responsibilities

The Shock & Vibration Information Center is one of the information centers established by the Director of Technical Information, DDR&E, and assigned to Navy for management and operation. It provides a single source within the Department of Defense for up-to-date information in the fields of shock and vibration for scientists and engineers in government agencies and for government contractors.

Key Personnel

Name	Title
Dr. W. W. Mutch	Head, S&V Information Center



Personnel Complement

On Board: 4

Total Estimated R&D Funding

Fiscal Year 1969: \$265,000

Dr. W. W. Mutch

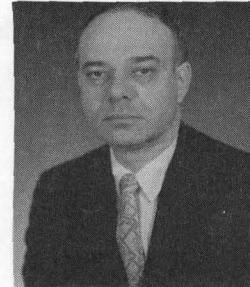
LABORATORY FOR STRUCTURE OF MATTER

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, and crystalline structure of materials. The methods of x-ray and electron diffraction are used in a broad program of structure studies which can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines.

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. J. Karle	Head, Laboratory for Structure of Matter



Personnel Complement

On Board: 9

Total Estimated R&D Funding

Fiscal Year 1969: \$400,000

Dr. J. Karle

LABORATORY FOR CHEMICAL PHYSICS

Basic Responsibilities

The Laboratory for Chemical Physics carries out an interdisciplinary program of fundamental and applied research with especial emphasis on phenomena occurring at phase boundaries, i.e., the interfaces between solids and solids, solids and liquids, solids and gases, liquids and liquids, and liquids and gases.

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. W. A. Zisman	Head, Laboratory for Chemical Physics



Personnel Complement

On Board: 10

Dr. W. A. Zisman

Total Estimated R&D Funding

Fiscal Year 1969: \$320,000

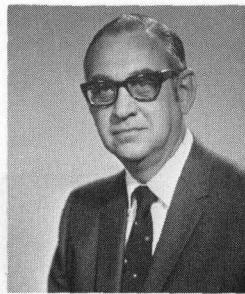
CENTRAL MATERIALS RESEARCH ACTIVITY

Basic Responsibilities

The responsibilities of the Central Materials Research Activity are twofold: (1) to perform basic and applied research in the preparation and characterization of materials, and (2) to provide consultation or assistance for all laboratory research personnel in the above matters. Special research areas investigated by the staff include single crystal, high purity, and rare earth materials. The primary facilities involved in characterization are x-ray diffraction techniques and solid state spark-source mass spectrometry.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. R. J. Ginther	Head, Central Materials Research Activity
Dr. F. L. Carter	Head, Diffraction and Special Materials Section
Dr. M. Krulfeld	Head, Crystals and Pure Materials Section



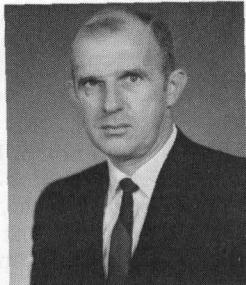
Personnel Complement

On Board: 13

Mr. R. J. Ginther

Total Estimated R&D Funding

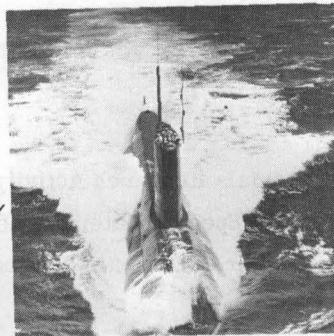
Fiscal Year 1969: \$390,000



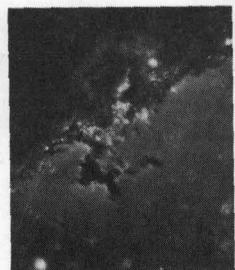
Dr. R. E. Kagarise

Chemistry Division

SUBMARINE HABITABILITY

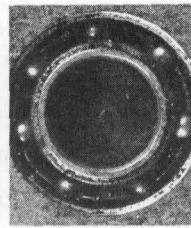


HIGH TEMPERATURE CORROSION

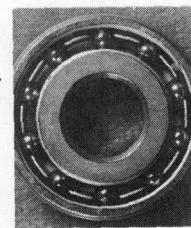


- PHYSICAL CHEMISTRY
- ORGANIC AND BIOLOGICAL CHEMISTRY
- INORGANIC CHEMISTRY
- PROTECTIVE CHEMISTRY
- ELECTROCHEMISTRY
- SURFACE CHEMISTRY
- FUELS

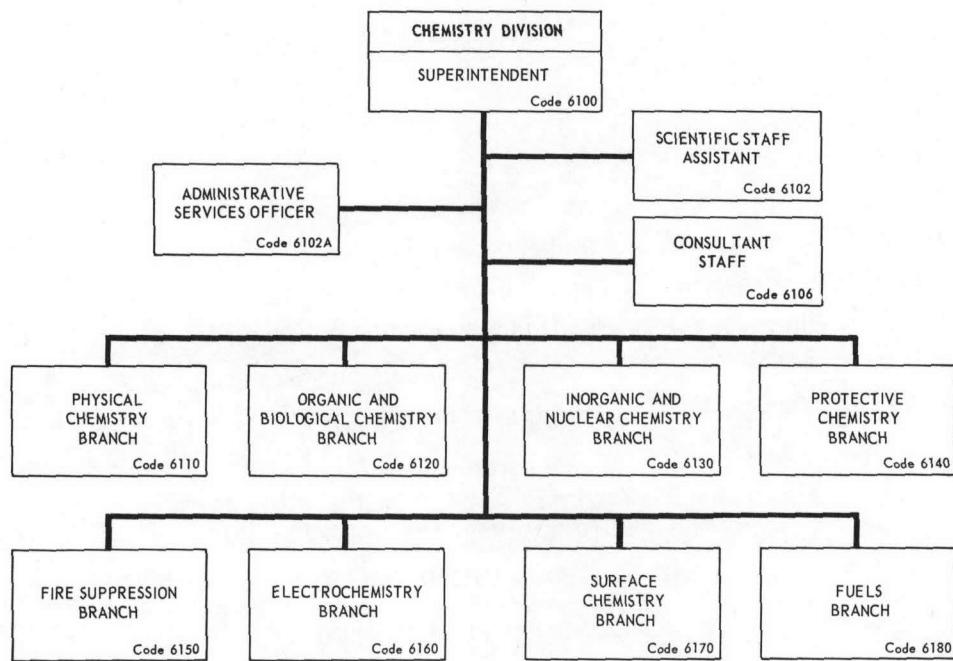
OLD SYSTEM
500 hrs.



NEW SYSTEM
3000 hrs.



BEARING LUBRICANTS



Basic Responsibilities

The Chemistry Division conducts a diversified program of basic and applied research and development in physical, organic, inorganic, radiation, and biological chemistry. Specialized programs within these fields include fuels, lubricants, corrosion, surface chemistry, fire suppression, protective coatings, polymers, electrochemistry, molecular structure, submarine atmosphere purification, and BW/CW personnel protection. Consultative services form an important element in the division effort.

Branches

Physical Chemistry

Atmospheric radioactivity
Infrared and ultraviolet spectroscopy
Analytical mass spectrometry
Nuclear magnetic resonance spectroscopy

Organic and Biological Chemistry

Microbiological research
Functional organic coatings
Properties of resins under high compressive loads

Inorganic Chemistry

High temperature materials
Submarine air purification
Oxygen generating chemicals
Corrosion mechanisms
Ceramic materials

Protective Chemistry

CW/BW ship defense
Adsorbents

Fire Suppression

Fire suppression agents and techniques for special hazards on board ships and naval shore activities
Interruption of fire propagation mechanism

Electrochemistry

Fuel cells
Fundamental electrode reactions
Electrochemical power sources

Surface Chemistry

Lubricants
Salvage of equipment damaged by sea water
Surface properties of fibers
Drag reduction

Fuels

Organic contaminants in submarine atmosphere
Distillate fuels research
Liquid propellant properties

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. R. E. Kagarise	Superintendent
Mr. R. C. Taylor	Consultant
Dr. L. B. Lockhart, Jr.	Head, Physical Chemistry Branch
Dr. A. L. Alexander	Head, Organic and Biological Chemistry Branch
Mr. R. R. Miller	Head, Inorganic Chemistry Branch
Dr. E. A. Ramskill	Head, Protective Chemistry Branch
Mr. H. B. Peterson	Head, Fire Suppression Branch (Acting)
Dr. J. C. White	Head, Electrochemistry Branch
Dr. C. R. Singleterry	Head, Surface Chemistry Branch
Dr. H. W. Carhart	Head, Fuels Branch

Personnel Complement

On Board: 127

Total Estimated R&D Funding

Fiscal Year 1969: \$3,600,000

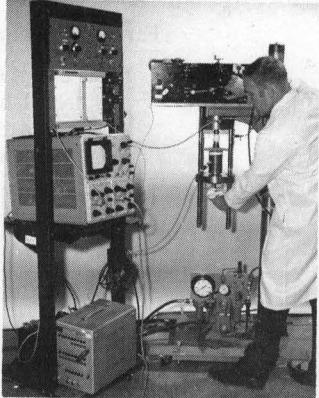


Mr. W. S. Pellini

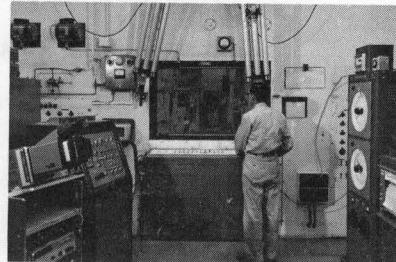
- PHYSICAL METALLURGY
- METAL PHYSICS
- THERMOSTRUCTURAL MATERIALS
- ANALYTICAL CHEMISTRY
- STRENGTH OF METALS
- REACTOR MATERIALS

Metallurgy Division

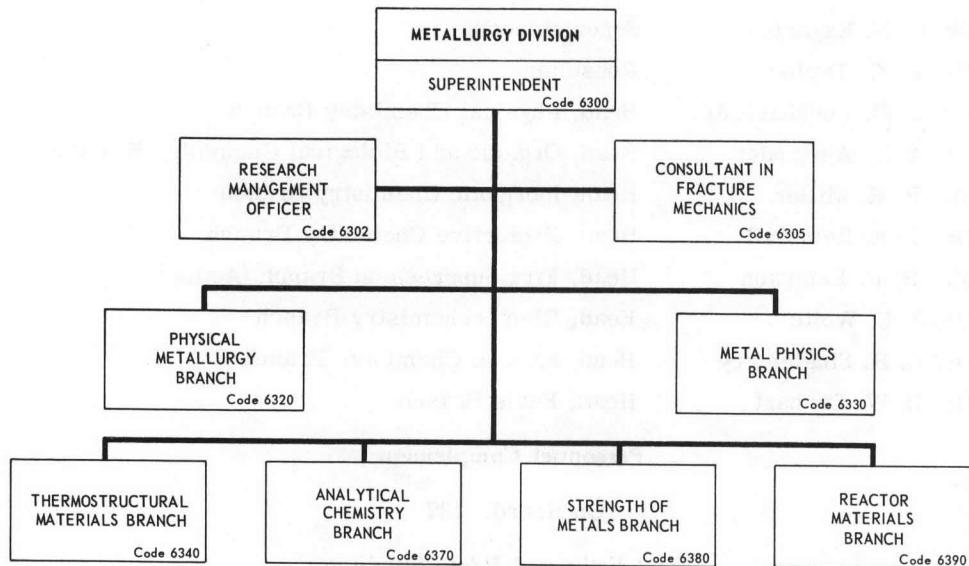
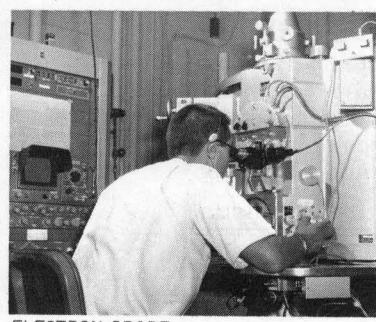
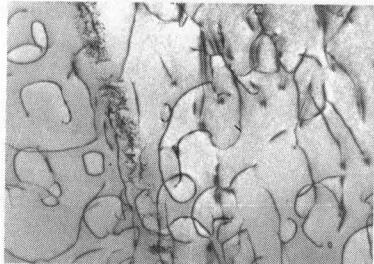
FRACTURE MECHANICS



REMOTE HANDLING ROOM



DEFECT STRUCTURES



Basic Responsibilities

The Metallurgy Division conducts research, development, and evaluation in the field of metallurgy, including the physical, mechanical, chemical, and structural aspects of metals. Important consultative services are provided to Navy and other DOD activities.

Branches

Physical Metallurgy

Fractography
Micromechanical metallurgy
Marine corrosion studies
Stress corrosion

Metal Physics

Liquid state and solidification
Electronic properties of metallic materials
Metallic imperfection studies
Effects of irradiation upon the solid state properties of metals

Thermostructural Materials

High-temperature flow and fracture
Effects of environment on fatigue and creep
Single crystals of refractory metals
Composites

Analytical Chemistry

Precision chemical analysis
Analytical techniques development
Determination of trace quantities of elements in small samples

Strength of Metals

Properties, selection criteria, and fracture-safe design parameters for high and ultra-high-strength structural metals

Reactor Materials

Properties of irradiated structural metals and alloys
Mechanisms of radiation degradation of metals
Neutron spectra and dosimetry

Key Personnel

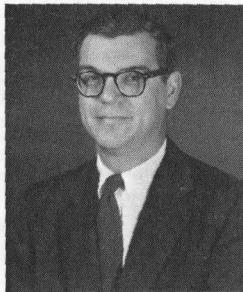
<i>Name</i>	<i>Title</i>
Mr. W. S. Pellini	Superintendent
Dr. J. M. Krafft	Consultant
Dr. B. F. Brown	Head, Physical Metallurgy Branch
Dr. A. I. Schindler	Head, Metal Physics Branch
Dr. M. R. Achter	Head, Thermostructural Materials Branch
Mr. D. I. Walter	Head, Analytical Chemistry Branch
Mr. R. J. Goode	Head, Strength of Metals Branch
Mr. L. E. Steele	Head, Reactor Materials Branch

Personnel Complement

On Board: 107

Total Estimated R&D Funding

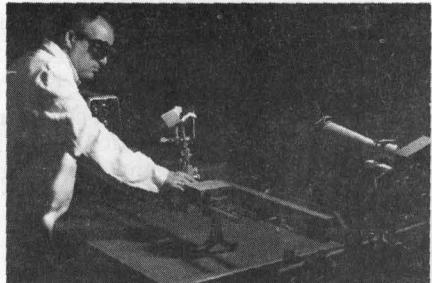
Fiscal Year 1969: \$3,788,400



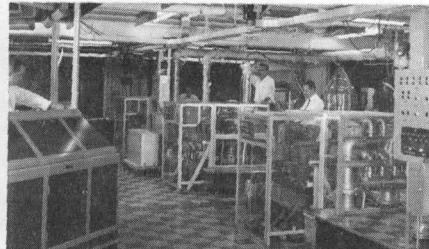
Dr. C. C. Klick

Solid State Division

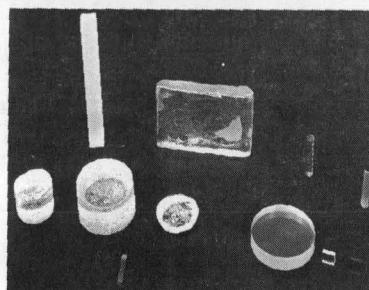
LASER
DEVELOPMENT



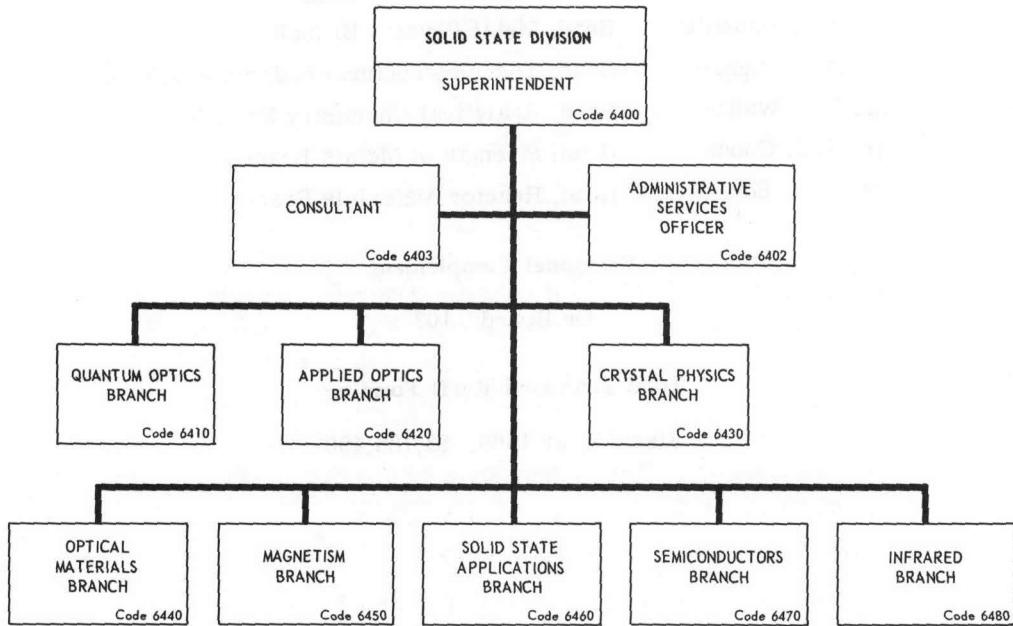
HIGH MAGNETIC FACILITY



LUMINESCENT
PROPERTIES
OF GLASS



- QUANTUM OPTICS
- APPLIED OPTICS
- CRYSTAL PHYSICS
- OPTICAL MATERIALS
- MAGNETISM
- SOLID STATE APPLICATIONS
- SEMICONDUCTORS
- INFRARED



Basic Responsibilities

The Solid State Division is concerned with basic and applied research in the physics of materials, principally solids, and with the interaction of matter with radiation, in the x-ray, ultraviolet, visible, and infrared regions of the spectrum. Its purposes are to increase understanding of the physical principles involved, to pursue applications of military and industrial problems, and to serve as a corps of experts in solids and optics for the Laboratory specifically and the Navy generally. The research work of the Division is fairly comprehensive in magnetism, semiconductors, and alkali halides. Important work is also carried on in quantum optics, surface physics, structure and optical properties of glass, properties of metals at low temperatures and high magnetic fields, the effects of high pressures on solids and radiation damage. Applications in infrared components and systems, solid state dosimeters, semiconductor photovoltaic cells, and a variety of optical and infrared problems involving air and sea are being pursued actively.

Branches

Quantum Optics

Nonlinear optics
Night vision
Lasers and mode-locking
Quantum effects in special materials
(dyes, liquid crystals, glasses)

Applied Optics

Laser applications
Undersea optics
Optical properties of materials, the atmosphere, and the ocean
Optical technology

Crystal Physics

High-pressure effects
Ferroelectric materials

Optical Materials

Electronic properties of nonmetal crystals and glasses
Radiation induced defects, color centers
Lattice dynamics

Magnetism

Electronic and nuclear paramagnetism
Spin-ordered magnetic phenomena
Magnetism and superconductivity at ultra-low temperatures

Solid State Applications

Environmental effects on semiconductor and dielectric materials and devices

Semiconductors

Electronic energy levels and band structure
Semiconductor applications
Physical properties of semiconductors
Cryomagnetism
Lattice Vibrations

Infrared

IR communications
Night vision systems
IR characteristics of hot gases, flares, and other materials
IR detectors
IR light sources such as semiconductor lasers
IR signatures of military targets
IR characteristics of the atmosphere
Optical properties of materials, the atmosphere, and the ocean

Key Personnel

Name	Title
Dr. C. C. Klick	Superintendent (Acting)
Mr. J. R. Clement	Associate Superintendent (Acting)
Mr. J. R. Clement	Consultant
Dr. H. Rabin	Head, Quantum Optics Branch
Dr. L. F. Drummetter, Jr.	Head, Applied Optics Branch
Dr. P. B. Alers	Head, Crystal Physics Branch
Dr. M. N. Kabler	Head, Optical Materials Branch (Acting)
Dr. G. T. Rado	Head, Magnetism Branch
Mr. E. L. Brancato	Head, Solid State Applications Branch
Dr. R. F. Wallis	Head, Semiconductors Branch
Dr. H. Shenker	Head, Infrared Branch

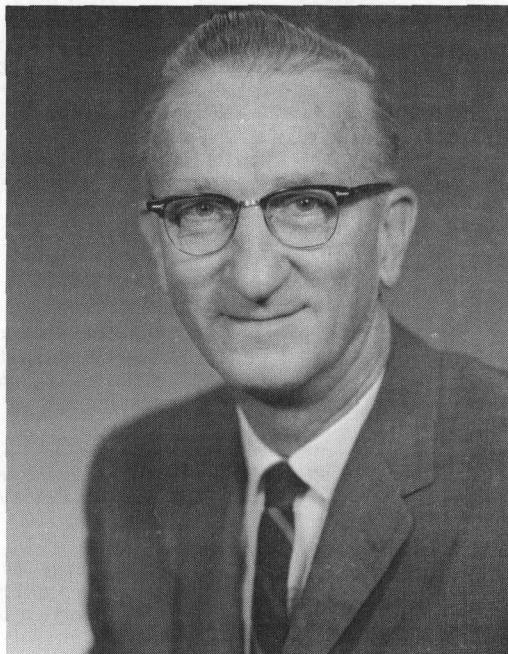
Personnel Complement

On Board: 126

Total Estimated R&D Funding

Fiscal Year 1969: \$4,500,000

General Sciences Area



Dr. Wayne C. Hall
Associate Director of Research for General Sciences

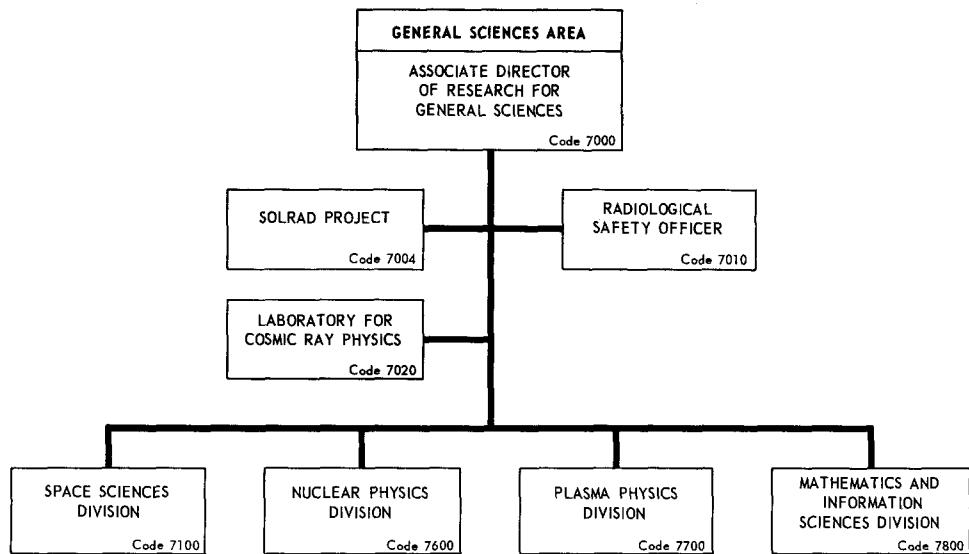
Dr. Hall [REDACTED] He was educated at the University of Kansas, where he received a Bachelor of Science degree in electrical engineering in 1931, a Master of Science degree in physics in 1933, and a Ph.D. in physics in 1936. He was an Assistant Instructor in the Physics Department at the University of Kansas from 1931 to 1935.

Dr. Hall came to the Laboratory in 1935 for research on the use of fuel cells to effect direct conversion of heat energy. During the next ten years he was also involved in studies of energy conversion, electronic strain gages, and torsion meters. His work on the problem of interference of precipitation static on aircraft radio communications ultimately led to development of the antiprecipitation static antenna and fittings now used on military and civilian aircraft to ensure the reliability of radio communications and radio navigational aids during severe weather conditions.

In January 1945 Dr. Hall was appointed Assistant Head of the Aircraft Electricity Division and later, in 1946, Superintendent of the Division. In this position he was responsible for a group of scientists conducting research and development on electrical power systems for aircraft, basic research in electricity and magnetism, and basic research in solid state physics and physical phenomena at ultralow temperatures. From 1948 through 1951, in addition to his duties as a Division Superintendent, he was Scientific Officer at NRL in charge of a project from the Los Alamos Scientific Laboratory involving diagnostic measurements in the atomic weapons program. Early in 1954 he became Superintendent of the Solid State Division at the Laboratory and was shortly thereafter appointed to the position of Associate Director of Research for Nucleonics. The title of this position was redesignated Associate Director of Research for General Sciences in February 1966.

Dr. Hall received the Distinguished Civilian Service Award in 1946 "for distinguished achievement in research on mitigation of precipitation static interference encountered by aircraft flying in adverse weather conditions."

Dr. Hall is a member of several professional societies, including the American Physical Society, Sigma Xi, RESA, Tau Beta Pi, and the National Philosophical Society and is a Fellow of the Institute of Electrical and Electronics Engineers and the Washington Academy of Sciences. He is the author of many technical papers and has been granted a number of patents.



Key Personnel

Dr. W. C. Hall	Associate Director of Research for General Sciences
Mr. E. W. Peterkin	SOLRAD Project, Technical Manager
Mr. L. A. Brauch	Radiological Safety Officer
Dr. M. M. Shapiro	Head, Laboratory for Cosmic Ray Physics
Dr. H. Friedman	Superintendent, Space Science Division
Dr. J. McElhinney	Superintendent, Nuclear Physics Division
Dr. A. C. Kolb	Superintendent, Plasma Physics Division
Dr. P. B. Richards	Superintendent, Mathematics & Information Sciences Division

SOLRAD PROJECT

Basic Responsibilities

The SOLRAD Project was established to support NAVAIR exploratory development tasks in solar x-ray monitoring, and specifically to (1) develop, construct, test, evaluate, and provide launch support of SOLRAD satellites, (2) track, command, and acquire satellite telemetry, and (3) reduce, analyze, and transmit solar emission data for scientific and application purposes.

Key Personnel

Name	Title
Mr. E. W. Peterkin	SOLRAD Project Manager
Mr. C. H. Chrisman	Assistant Manager for Data Processing
Mr. P. W. Wilhelm	Assistant Manager for Space Craft
Mr. R. W. Kreplin	Scientific Program Manager
Mr. G. E. Leavitt	Technical Assistant for Experiments Electronics



Manpower Support: 35 Man-years

Mr. E. W. Peterkin

Total Estimated R&D Funding

Fiscal Year 1969: \$1,427,000

RADIOLOGICAL SAFETY OFFICE

Basic Responsibilities

The Health Physics Staff is assigned the overall responsibility for radiological safety at the Naval Research Laboratory and acts, as requested, as representative of the Office of Naval Research in radiological safety matters. The NRL radiological safety program has three primary purposes: (1) to assure that all operations using ionizing radiation are safe and in compliance with Federal Regulations; (2) to provide employees with instruments, instructions, and assistance to assure radiation safety in the performance of their duties; and (3) to conduct research in radiation dosimetry, instrumentation, and methodology.

Key Personnel

Name	Title
Mr. L. A. Brauch	Radiological Safety Officer
Mr. R. L. Flournoy	Assistant Radiological Safety Officer
Mr. T. L. Johnson	Head, Research Section
Mr. J. N. Stone	Head, Operations Section
Mr. R. B. Luerson	Head, Accelerators and Analysis Section



Personnel Complement

On Board: 19

Mr. L. A. Brauch

Total Estimated R&D Funding

Fiscal Year 1969: \$295,300

LABORATORY FOR COSMIC RAY PHYSICS

Basic Responsibilities

The Laboratory for Cosmic Ray Physics conducts a program of fundamental investigations of cosmic radiation—its composition and spectra, its origin, its "age," its propagation through space, its interactions with particles and fields in the regions of space that it traverses, and its role in various astrophysical phenomena. The program is framed so as to be broadly responsive to the anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. M. M. Shapiro	Chief Scientist
Mr. B. Stiller	Head, Emulsion Techniques Section
Mr. N. Seeman	Head, Counter Techniques Section
Dr. R. Silberberg	Senior Scientist
Mr. F. W. O'Dell	Senior Scientist



Personnel Complement

Dr. M. M. Shapiro

On Board: 25

Total Estimated R&D Funding

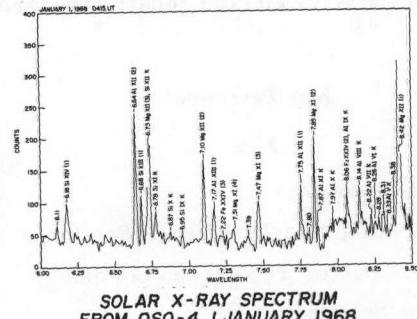
Fiscal Year 1969: \$725,000



Dr. H. Friedman

UPPER AIR PHYSICS
RADIO ASTRONOMY
ROCKET SPECTROSCOPY
• • • • • • •
E. O. HULBURT CENTER

E. O. HULBURT CENTER



SOLAR X-RAY SPECTRUM
FROM OSO-4, 1 JANUARY 1968

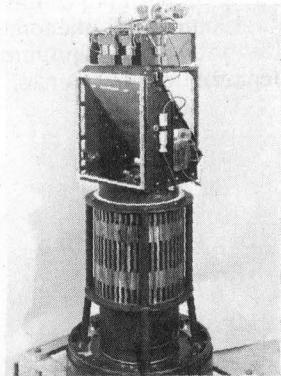
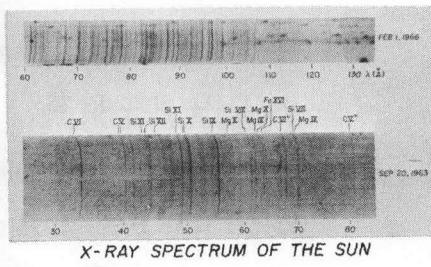


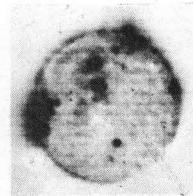
IMAGE-CONVERTER SPECTROGRAPH FOR FAR-UV ROCKET ASTRONOMY



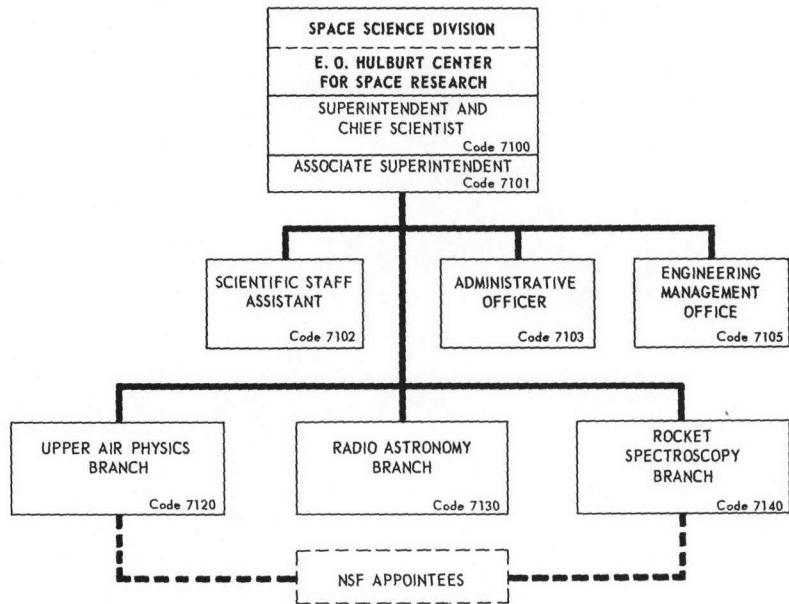
RADIO
TELESCOPE
MARYLAND
POINT



X-RAY SPECTRUM OF THE SUN



SPECTROHELIOPHOTOGRAM
171-400 Å (APPROX)
JULY 27, 1966



Basic Responsibilities

The Space Science Division conducts research, development, and test in the fields of upper air physics, astronomy, and astrophysics. Satellites and rockets are used to obtain information on radiation from the sun and celestial sources, and to study the composition and behavior of the ionosphere. Radio telescopes are used for astronomical observations. Results are of importance to radio communications, to utilization of the space environment, and to the fundamental understanding of natural radiation phenomena.

Branches

Upper Air Physics

Gamma-ray, x-ray, ultraviolet, and infrared astronomy
Aeronomy
Solar x-ray monitoring satellites
Electronic imaging studies
Meteor astronomy

Radio Astronomy

Galactic and extragalactic radio astronomy
Radar measurements of earth-moon distance and topography of moon
Radar and microwave applications to oceanography

Rocket Spectroscopy

X-ray and ultraviolet solar spectroscopy
Spectroheliographic and coronagraphic research
Laboratory astrophysics
XUV spectroradiometry

E. O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and post-graduate students and visiting faculty members to cooperate with NRL in space research.

Key Personnel

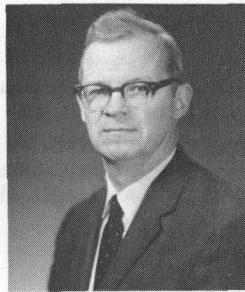
<i>Name</i>	<i>Title</i>
Dr. H. Friedman	Superintendent
Dr. P. W. Mange	Associate Superintendent (Acting)
Mr. R. C. Meyer	Engineering Consultant
Dr. T. A. Chubb	Head, Upper Air Physics Branch
Mr. C. H. Mayer	Head, Radio Astronomy Branch
Dr. R. Tousey	Head, Rocket Spectroscopy Branch
Dr. H. Friedman	Chief Scientist, Hulburt Center

Personnel Complement

On Board: 128

Total Estimated R&D Funding

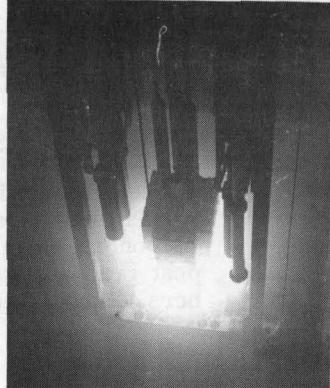
Fiscal Year 1969: \$12,041,000



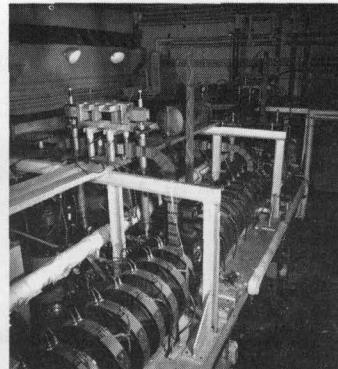
Dr. J. McElhinney

Nuclear Physics Division

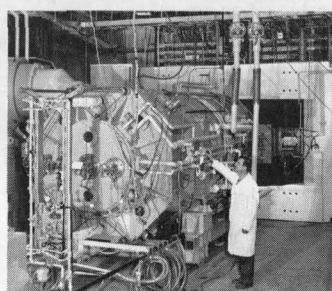
- CYCLOTRON
- LINAC
- NUCLEAR SYSTEMS
- REACTORS
- THEORY
- VAN DE GRAAFF
- X-RAY OPTICS



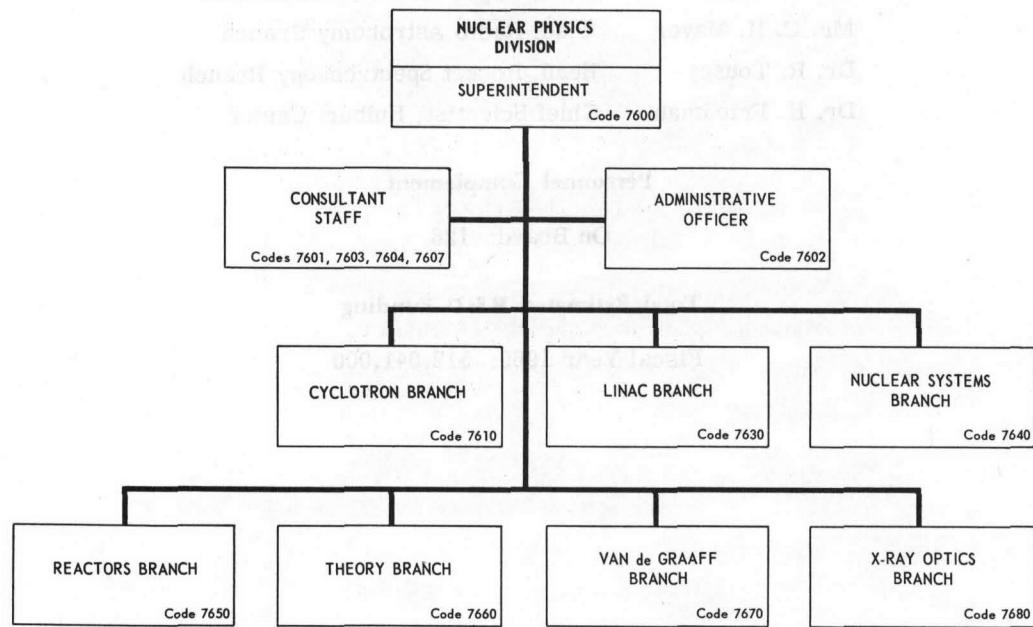
REACTOR CORE



LINAC



CYCLOTRON



Basic Responsibilities

The Nuclear Physics Division is engaged in a broad program of basic and applied research in nuclear physics and related areas. Included are theoretical and experimental programs in properties of nuclei, nuclear forces, nuclear reactions, shielding studies, x-ray and electron optics, materials analysis, and weapon-related research. The Division operates a 75-Mv sector focussing cyclotron, 60-Mv Linac, 1-megawatt reactor, 5-Mv Van de Graaff, and other particle accelerators and radiation sources.

Branches

Cyclotron

Charged particle nuclear reactions
Nuclear structure
Charged particle scattering
Neutron shielding
Radioactivation analysis
Production of radioactive sources

Reactors

Neutron activation analysis
Production of radioactive sources
Neutron diffraction
Neutron capture reactions
Radioactive decay

Linac

Electron scattering
Photonuclear reactions
Nuclear excitation
Neutron capture reactions
Pulsed radiation effects
Radioactivation analysis

Theory

Nuclear reactions
Field theory
Elementary-particle physics
Nuclear structure
Nonlinear optics
Mathematical physics

Van de Graaff

Charged particle nuclear reactions
Nuclear structure
Radiation damage due to charged particles
Surface and film analysis by nuclear techniques

Nuclear Systems

Low-level nuclear radiation detectors for special purposes

X-Ray Optics

X-ray spectral measurements
X-ray fluorescence analysis
Electron probe micro-analysis

Key Personnel

Name	Title
Dr. J. McElhinney	Superintendent
Dr. E. A. Wolicki	Consultant and Associate Superintendent (Acting)
Dr. C. V. Strain	Consultant
Mr. F. H. Attix	Consultant
Dr. R. O. Bondelid	Head, Cyclotron Branch
Dr. T. F. Godlove	Head, Linac Branch
Mr. D. C. Cook	Head, Nuclear Systems Branch
Dr. K. W. Marlow	Head, Reactors Branch
Dr. A. W. Saenz	Head, Theory Branch
Dr. K. L. Dunning	Head, Van de Graaff Branch
Mr. L. S. Birks	Head, X-Ray Optics Branch

Personnel Complement

On Board: 118

Total Estimated R&D Funding

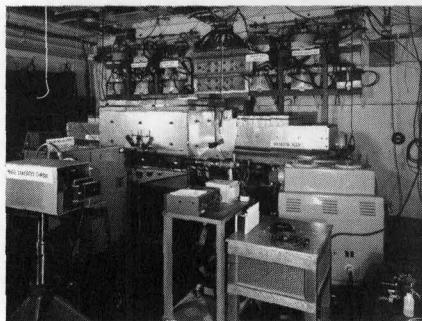
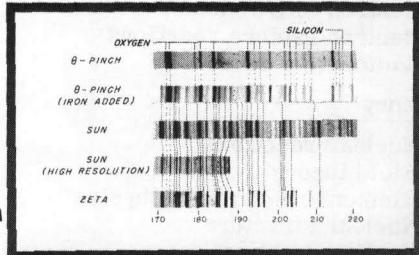
Fiscal Year 1969: \$3,655,000



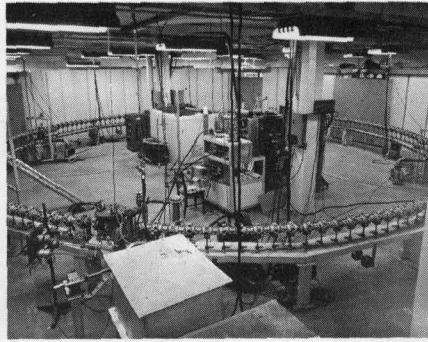
Dr. A. C. Kolb

Plasma Physics Division

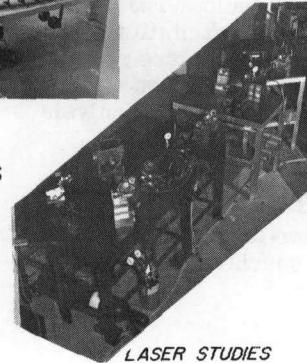
STAR
vs.
LAB
SPECTRA



θ-PINCH FACILITY

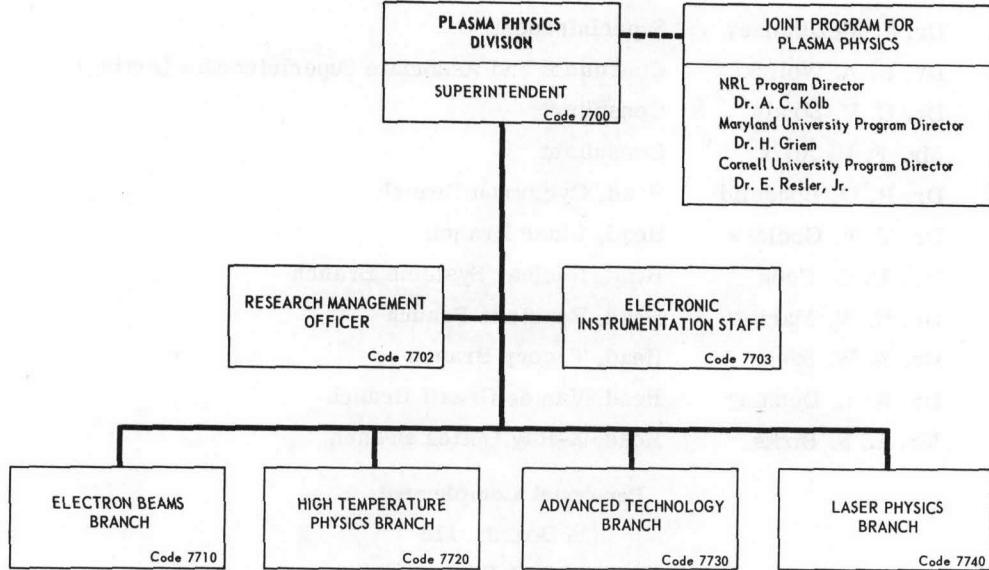


SOZOTRON



LASER STUDIES

- ELECTRON BEAMS
- HIGH TEMPERATURE PHYSICS
- ADVANCED TECHNOLOGY
- LASER PHYSICS



Basic Responsibilities

The Plasma Physics Division conducts both basic and applied research. Examples of effort underway include: fusion physics and the generation and containment of high-temperature plasmas, directed toward eventual power sources; laboratory astrophysics; electron beams; and high-power lasers. This Division, the University of Maryland, and Cornell University engage in a joint program of research in plasma physics. In addition to increasing significantly the scientific breadth of the participating institutions, the program is acquainting graduate students with research frontiers in plasma physics through association with leading scientists in the field. Students have an opportunity to use NRL facilities and talent for thesis research, and NRL scientists, in turn, are able to use the research facilities of both universities.

Branches

Electronic Instrumentation

Instrumentation support to the Division for control measurement of experiments

Electron Beams

Production and applications of intense electron beams
Beam stabilization

High Temperature Physics

Physics and utilization of ultra-high-temperature plasmas
Nonlinear optics

Advanced Technology

Technological support to the Division in the form of electrical, mechanical, optical, and vacuum systems

Laser Physics

Physics of solid state and gas lasers

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. A. C. Kolb	Superintendent
Mr. J. D. Shipman	Head, Electronic Instrumentation Staff
Mr. D. C. dePackh	Head, Electron Beams Branch
Dr. R. C. Elton	Head, High Temperature Physics Branch
Dr. W. A. Lupton	Head, Advanced Technology Branch
Vacant	Head, Laser Physics Branch

Personnel Complement

On Board: 63

Total Estimated R&D Funding

Fiscal Year 1969: \$4,941,000

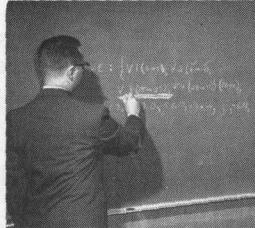


Dr. P. B. Richards

Mathematics and Information Sciences Division

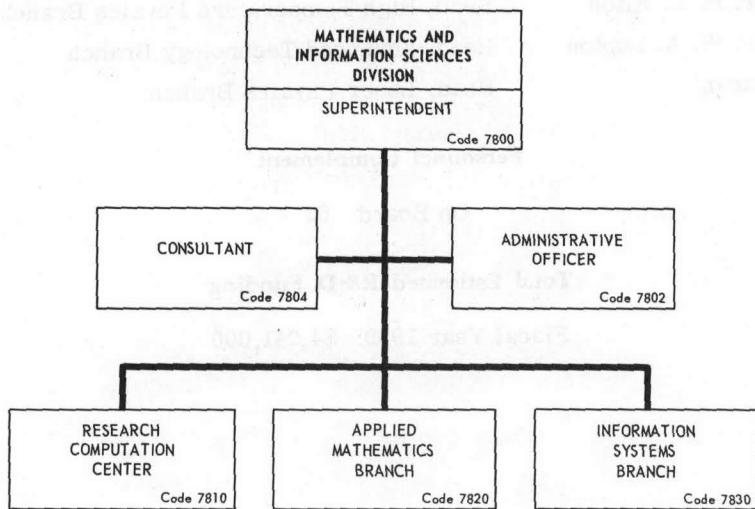
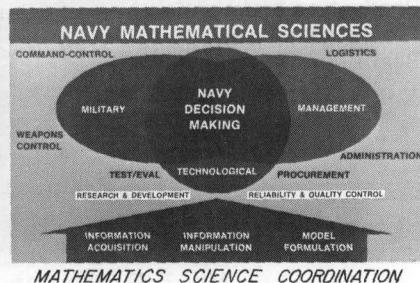
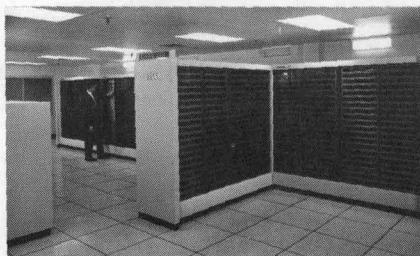
- RESEARCH COMPUTATION CENTER
- APPLIED MATHEMATICS
- INFORMATION SYSTEMS

APPLIED MATHEMATICS



RESEARCH COMPUTATION CENTER

CDC 3800 COMPUTER



Basic Responsibilities

The Mathematics and Information Sciences Division conducts basic and applied research in the mathematical sciences; determines present and future Navy needs with reference to mathematics and the computer-oriented sciences; and creates and maintains the competence required to formulate and to meet these needs.

Branches

Research Computation

Data engineering and operations
Analog computer
Programming
Programming systems
Information retrieval

Applied Mathematics

Mathematical concepts of physical phenomena
Optimization
Probability and statistics
Pure and applied mathematics

Information Systems

Signal processing
Surveillance and intelligence
Engineering applications
Computer science
Information system development
Operations analysis and logistics

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. P. B. Richards	Superintendent
Dr. B. Lepson	Consultant
Mr. A. B. Bligh	Head, Research Computation Branch
Dr. H. Hauptman	Head, Applied Mathematics Branch
Dr. B. Wald	Head, Information Systems Branch

Personnel Complement

On Board: 82

Total Estimated R&D Funding

Fiscal Year 1969: \$1,200,000

Oceanology Area



Dr. Ralph R. Goodman
Associate Director of Research for Oceanology

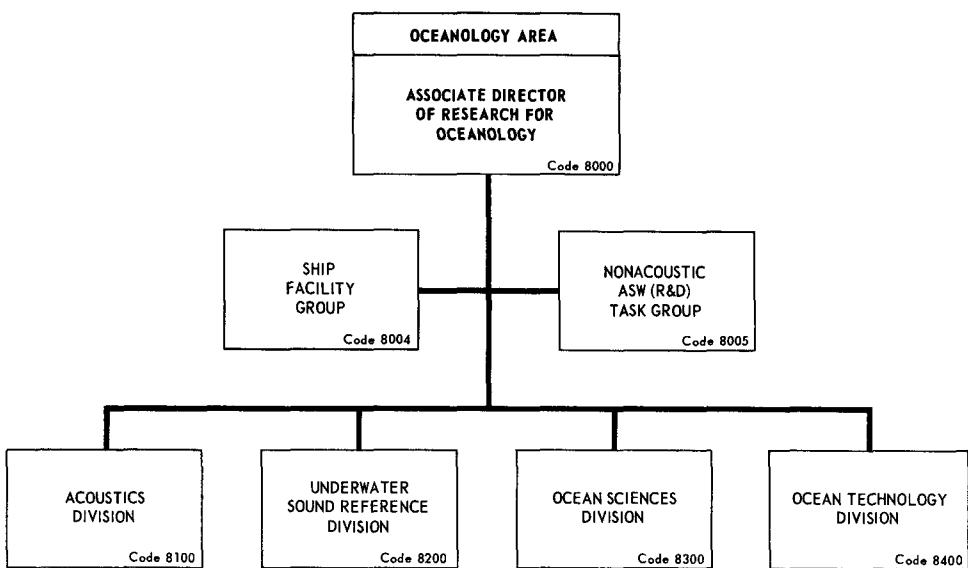
Dr. Goodman was born in Detroit, Michigan on March 18, 1927. He attended the University of Michigan, at Ann Arbor, where in 1950 he received a B.S. degree in mathematics, in 1951 a B.S. in physics, in 1952 an M.S. in physics, and in 1958 a Ph.D. in physics.

Before coming to NRL in September 1968, Dr. Goodman had held positions at NEL, at Colorado State University, and at the SACLANT ASW Research Center in La Spezia, Italy. He began his career as a scientist with the U.S. Navy Electronics Laboratory at San Diego, California, where he remained for 18 months. He left NEL in 1959 to join the staff of Colorado State University as an Assistant Professor; while serving in that capacity from 1959 to 1961, he also conducted research in theoretical physics and gave lectures and performed consulting services outside the University.

From 1961 to 1963, Dr. Goodman served as a consultant to the Applied Physics Group at the SACLANT ASW Research Center, La Spezia, Italy.

He then returned to Colorado State University, where from 1963 to 1968 he served as Professor of Physics. During his last year there (1968), he also served as the Acting Chairman of the Department of Physics.

Dr. Goodman is a member of the American Physical Society, the Acoustical Society of America, the American Geophysical Union, the American Institute of Physics, Sigma Xi, Phi Kappa Phi, and Tau Beta Pi. He was also a member of the Board of Trustees of the Colorado State University Research Foundation and the NAS/NRC Committee on Undersea Warfare.



Key Personnel

Dr. R. R. Goodman	Associate Director of Research for Oceanography
Mr. A. L. Gotthardt	Ship Facility Group
Mr. F. C. Macdonald	Nonacoustic ASW (R&D) Task Group (Acting)
Dr. J. C. Munson	Superintendent, Acoustics Division
Mr. R. J. Bobber	Superintendent, Underwater Sound Reference Division
Dr. V. J. Linnenbom	Superintendent, Ocean Sciences Division
Mr. J. A. Kies	Superintendent, Ocean Technology Division (Acting)

NONACOUSTIC ASW R&D TASK GROUP

Basic Responsibilities

The Nonacoustic ASW R&D Task Group consolidates the NRL efforts in the area of nonacoustic anti-submarine warfare research and development and also acts as the management center for the Nonacoustic Submarine Effects (NASE) program fiscally supported by the NAVAIRSYSCOM.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. F. C. Macdonald	Director, Nonacoustic ASW R&D Task Group (Acting)



Personnel Complement

On Board: 3

Total Estimated R&D Funding

Fiscal Year 1969: \$1,623,000

Mr. F. C. Macdonald

SHIP FACILITY GROUP

Basic Responsibilities

The Ship Facility Group is responsible for coordinating and providing ship services, sea-going facilities, and specialized expertise common to and required by the at-sea experiments of Research Divisions under the Associate Director of Research for Oceanology.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. A. L. Gotthardt	Head, Ship Facility Group



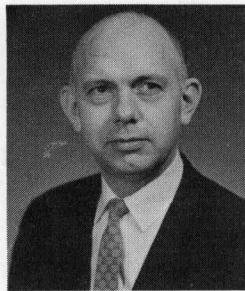
Personnel Complement

On Board: 9

Total Estimated R&D Funding

Mr. A. L. Gotthardt

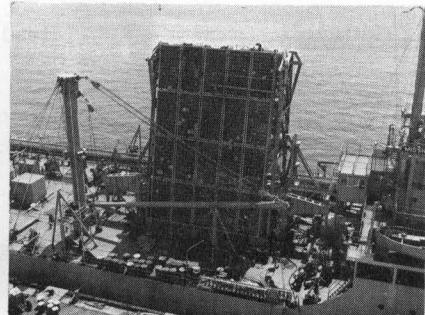
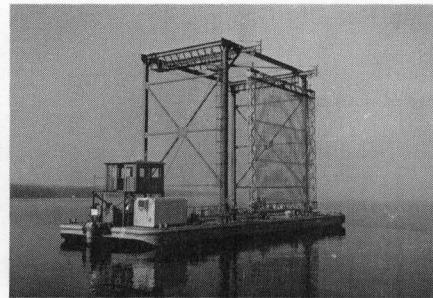
Fiscal Year 1969: \$2,460,000



Dr. J. C. Munson

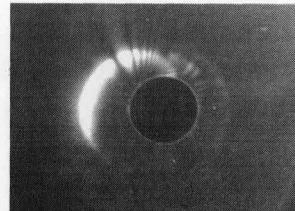
Acoustics Division

NEAR FIELD ARRAY

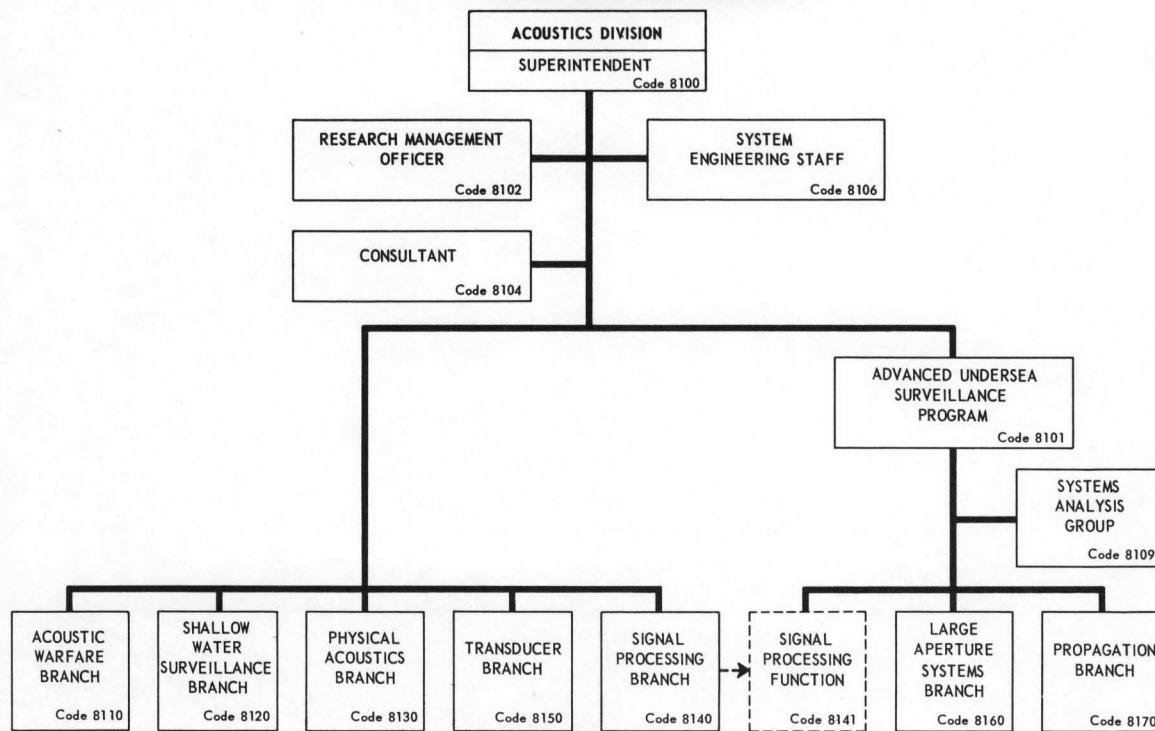


ARTEMIS TRANSDUCER ARRAY

- ACOUSTIC WARFARE
- LARGE APERTURE SYSTEMS
- PHYSICAL ACOUSTICS
- SIGNAL PROCESSING
- TRANSDUCER
- PROPAGATION
- SHALLOW WATER SURVEILLANCE



CREEPING WAVE PHENOMENA



Basic Responsibilities

The Acoustics Division has major responsibility for basic research and development in undersea acoustic surveillance. The spectrum of work covered in the program includes theoretical acoustics, system concepts, validation of operational concepts, and systems analysis. The Division also conducts theoretical and experimental research programs in physical acoustics, ocean acoustics, and predictive oceanography to develop theory and models of the interaction of acoustics with structures and the ocean environment for the Navy undersea warfare programs and for research and development programs of the Division in the fields of transducers, signal processing, and acoustic warfare. The Division works with research programs outside the Division, such as materials, oceanography, and deep ocean technology, to provide these supporting disciplines with information on long-range material and on environmental data and technology needs, and to obtain cooperation on joint programs which must cross disciplinary lines.

Staff Activities

System Engineering

Support and ship facility
Acoustic sources

Systems Analysis

Systems studies
Strategic and tactical systems planning
and evaluation

Branches

Acoustic Warfare

Ship wake acoustics
Acoustic countermeasure techniques
Assured sonar range studies
Undersea warfare
Submarine ocean interactions

Transducer

Basic radiation theory
Electroacoustic modeling
Transducer physical models
Transducer mathematical models
Calibration of large transducer arrays
Transducer materials research

Shallow Water Surveillance

Sound speeds in the ocean
Signal analysis
Shallow water propagation
Predictive oceanography

Large Aperture Systems

Active target detection and classification
Passive target detection and classification
Propagation, coherency, and wave front behavior

Physical Acoustics

Microacoustics
Flow acoustics
Ultrasonics

Propagation

Long-range propagation models
Application of low-range low-frequency
propagation
Scattering from ocean bottom, surface,
and volume
Natural and man-made noise

Signal Processing

Signal processing and display
Passive signal structure classification studies

Key Personnel

Name	Title
Dr. J. C. Munson	Superintendent
Mr. A. T. McClinton	Head, System Engineering Staff
Mr. F. C. Titcomb	Head, Systems Analysis Group (Acting)
Mr. R. H. Mathes	Head, Acoustic Warfare Branch
Mr. R. H. Ferris	Head, Shallow Water Surveillance Branch (Acting)
Dr. W. G. Neubauer	Head, Physical Acoustics Branch (Acting)
Mr. H. L. Peterson	Head, Signal Processing Branch (Acting)
Mr. S. Hanish	Head, Transducer Branch
Dr. B. B. Adams	Head, Large Aperture Systems Branch
Mr. B. G. Hurdle	Head, Propagation Branch (Acting)

Personnel Complement

On Board: 118
(Graded 114, Ungraded 4)

Total Estimated R&D Funding

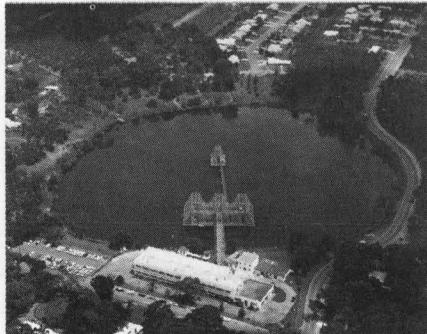
Fiscal Year 1969: \$4,815,000



Mr. R. J. Bobber

- UNDERWATER ELECTROACOUSTIC MEASUREMENT METHODS
- UNDERWATER ELECTROACOUSTIC STANDARDS
- UNDERWATER ELECTROACOUSTIC TEST & EVALUATION

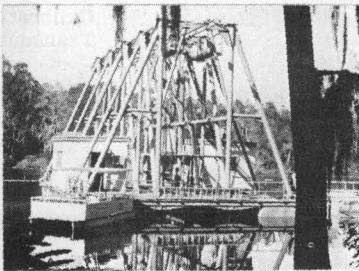
UNDERWATER SOUND REFERENCE DIVISION,
ORLANDO, FLORIDA



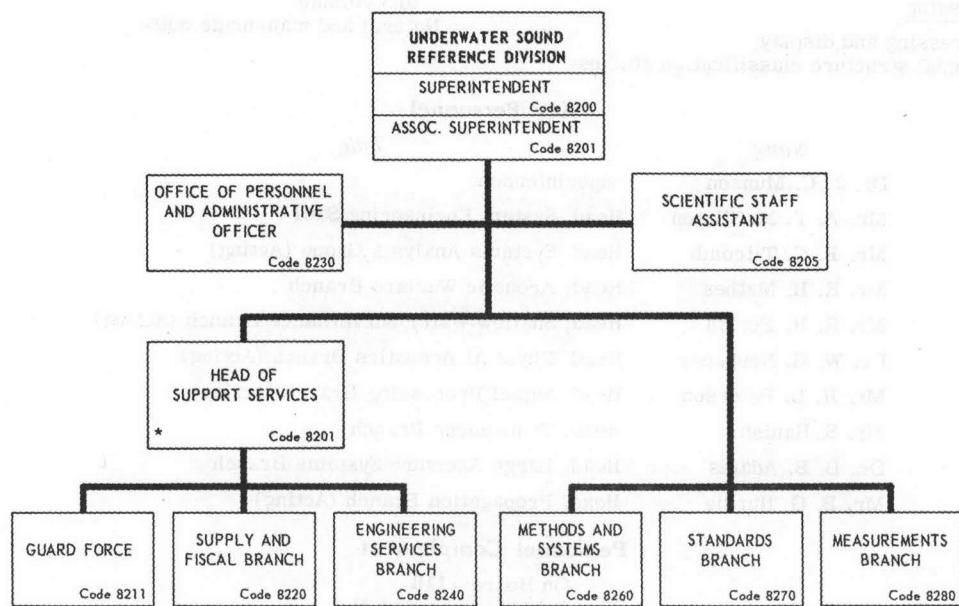
HIGH-FREQUENCY LABORATORY



ANECHOIC TANK



LEESBURG FACILITY-
CALIBRATION BARGE



* Indicates collateral duty as Assoc. Superintendent.

Basic Responsibilities

The Underwater Sound Reference Division is a focal point in the Navy for standardization in the science and technology of underwater sound measurements. Its research and development program is aimed at expanding the state of the art and providing Navy in-house expertise. Reference calibration measurements in a large complex of specialized facilities and calibrated standard transducers are available to all naval activities and contractors in support of undersea warfare programs.

Research and Development Branches

Methods and Systems

Calibration theory
Measurement methods
Digital and analog systems
Acoustic absorption
Cavitation studies

Standards

Transducer materials
Electroacoustic standards
Acoustic sources
Specialized electroacoustic transducers
Vibration analysis techniques
Standard loan services

Measurements

Standard calibration services
Sonar transducer test and evaluation
Measurements on acoustic materials
Simulated deep-submergence measurements
Measurement facility development

Key Personnel

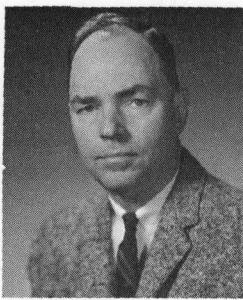
<i>Name</i>	<i>Title</i>
Mr. R. J. Bobber	Superintendent
Mr. D. T. Hawley	Associate Superintendent
Mr. J. M. Taylor	Scientific Staff Assistant
Mr. J. C. Michael	Supply and Fiscal Officer
Mrs. W. M. Scott	Personnel and Administrative Officer
Mr. J. F. Prandoni	Head, Engineering Services Branch
Mr. G. A. Sabin	Head, Methods and Systems Branch (Acting)
Mr. I. D. Groves	Head, Standards Branch
Dr. W. L. Paine	Head, Measurements Branch

Personnel Complement

On Board: 100
(Graded 80, Ungraded 20)

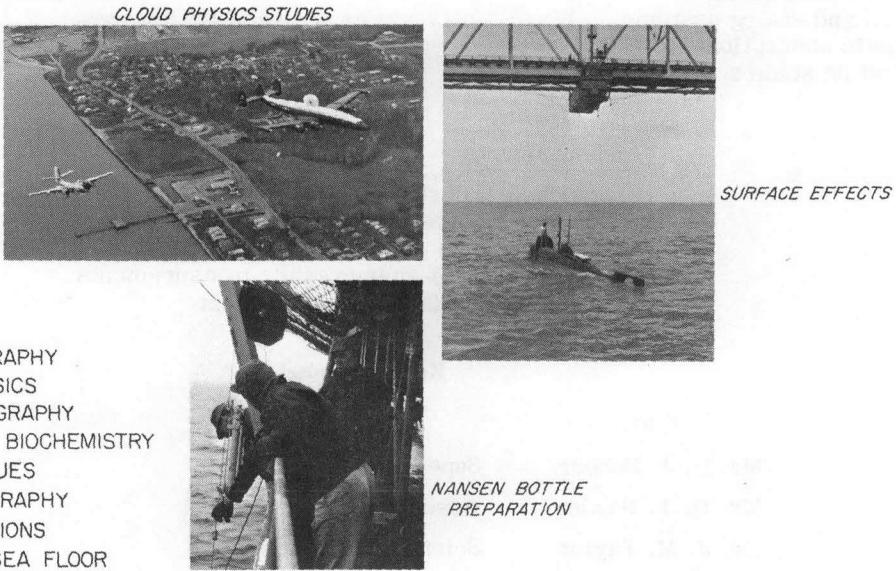
Total Estimated R&D Funding

Fiscal Year 1969: \$1,373,000

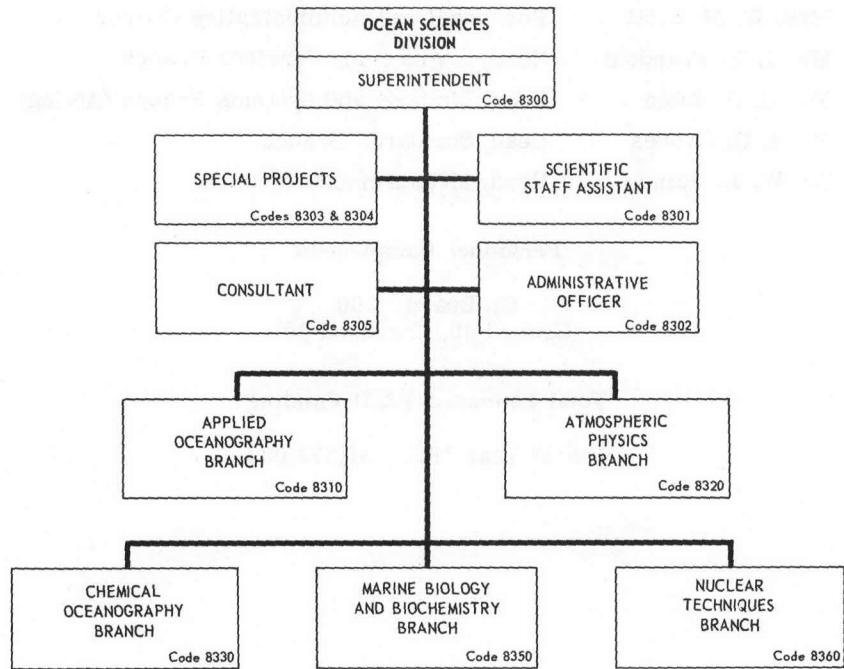


Dr. V. J. Linnenbom

Ocean Sciences Division



- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- MARINE BIOLOGY & BIOCHEMISTRY
- NUCLEAR TECHNIQUES
- PHYSICAL OCEANOGRAPHY
- AIR/SEA INTERACTIONS
- GEOPHYSICS AND SEA FLOOR



Basic Responsibilities

The Ocean Sciences Division conducts basic and applied research and development in the ocean sciences. Included are studies of the physics, chemistry, geology, and biology of the oceans directed toward an improved understanding and use of the oceans as the major operating environment of the Navy. Practical results lead ultimately to improvement in the design and effectiveness of naval equipment, materials, and systems.

Branches

Applied Oceanography

Nonacoustic detection of submarines
Hydrodynamics of submerged bodies
Infrared characteristics of the ocean

Atmospheric Physics

Interactions between the atmosphere and
the ocean
Dynamics of the atmosphere
Physics of clouds
Weather instrumentation

Chemical Oceanography

Physical and analytical chemistry of sea-
water, dissolved gases, and marine
sediments

Marine Biology and Biochemistry

Biodegradation of materials in the marine
environment
Organic chemistry of seawater
Biochemistry of marine organisms

Nuclear Techniques

Application of nuclear techniques to
oceanography

Key Personnel

<i>Name</i>	<i>Title</i>
Dr. V. J. Linnenbom	Superintendent
Dr. A. H. Schooley	Senior Research Scientist
Dr. M. F. M. Osborne	Consultant
Mr. H. L. Clark	Head, Applied Oceanography Branch
Dr. J. E. Dinger	Head, Atmospheric Physics Branch
Dr. C. H. Cheek	Head, Chemical Oceanography Branch
Dr. J. M. Leonard	Head, Marine Biology and Biochemistry Branch
Mr. J. I. Hoover	Head, Nuclear Techniques Branch

Personnel Complement

On Board: 91

Total Estimated R&D Funding

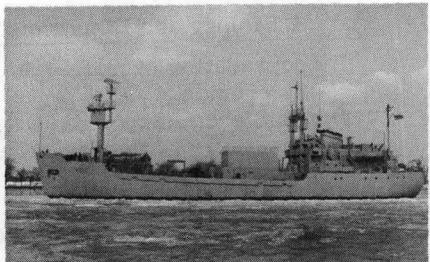
Fiscal Year 1969: \$4,935,000



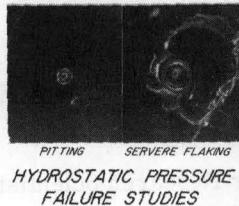
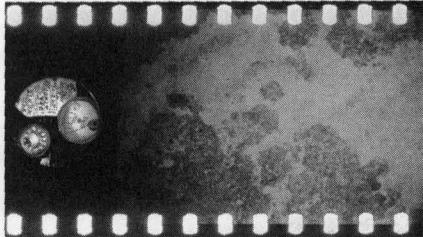
Mr. J. A. Kies

Ocean Technology Division

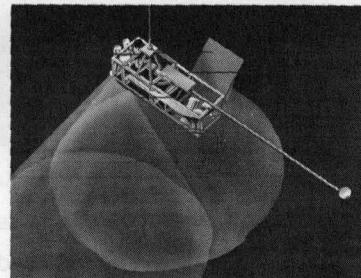
MIZAR



BOTTOM STUDIES



PITTING SEVERE FLAKING
HYDROSTATIC PRESSURE
FAILURE STUDIES



UNDERWATER CAMERA

OCEAN TECHNOLOGY
DIVISION

SUPERINTENDENT

Code 8400

RESEARCH MANAGEMENT
OFFICER

Code 8402

OCEAN
ENGINEERING
BRANCH

Code 8410

OCEAN MATERIALS
CRITERIA
BRANCH

Code 8430

OCEAN
STRUCTURES
BRANCH

Code 8440

Basic Responsibilities

The Ocean Technology Division researches, develops, and applies specialized equipment, instrumentation, techniques for conducting ocean and ocean-floor operations, and evolves operational technology for advanced systems. The Division utilizes advanced materials and design technology for engineering optimization of required equipment. It also conducts research activities in select areas of ocean technology with coupling and support activities related to other ongoing research and development in these and other fields of interest. This Division in conjunction with other Divisions of NRL and out-of-house agencies brings to bear on crucial problems the collective expertise available.

Branches

Ocean Engineering

Deep-ocean instrumentation and investigations
Hydrodynamics of deep towing
Reliable acoustic paths

Ocean Materials Criteria

Fracture mechanics and fracture strength
Plastic flowing
Compression failure mechanisms
Armor research and development
Deep submergence materials-structures
Missile component failure
Nondestructive testing

Ocean Structures

Shipboard shock fundamentals
Shock protection for weapons systems
Methods for design against shock
Fracture mechanics design studies
Developmental studies of prototypes
Shock strength of materials
Shock propagation and instrumentation
Hydromechanic studies

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. J. A. Kies	Superintendent (Acting)
Dr. Henri Marcus	Consultant
Mr. C. L. Buchanan	Head, Ocean Engineering Branch
Mr. J. A. Kies	Head, Ocean Materials Criteria Branch
Dr. R. O. Belsheim	Head, Ocean Structures Branch

Personnel Complement

On Board: 70

Total Estimated R&D Funding

Fiscal Year 1969: \$2,243,000

Part 4

The Support Services Department



Captain George Maragos, USN
Director of Support Services

Captain George Maragos is a native of St. Louis, Missouri. He is a graduate of the U.S. Naval Academy (1946), the Massachusetts Institute of Technology (BSEE, 1949), and various service schools. He has had sea duty with the cruisers PORTSMOUTH and HOUSTON and the aircraft carrier SAIPAN. From 1950-1952 he was assigned to the Production Department, Portsmouth, N. H., Naval Shipyard, where he was Ship Superintendent, New Construction Submarines.

CAPT Maragos spent the next two years as Staff Electronics Officer with the Florida Group, Atlantic Reserve Fleet, and then reported to the Bureau of Ships for an assignment as Assistant to the Head of the Submarine Electronics Engineering Section (1954-1956). While assigned to the Electric Boat Division of General Dynamics, Groton, Conn. (1956-1960), he was Head of the Contract and Materials Department, which administered shipbuilding and repair contracts for submarines of all types, including nuclear and FBM (Polaris) submarines, and was responsible for fitting out new construction submarines.

CAPT Maragos returned to the Naval Academy in 1960 as an Instructor of Electronics and Electricity and as Military Chairman of the Science Department's Electronics Committee. On July 14, 1966, he reported for duty at NRL as Engineering Services Officer. He came to NRL from the Ship Systems Command Headquarters; there he was Liaison Officer, Surface Missile Systems (Talos, Tartar, and Terrier) Project Office (1962-1966).

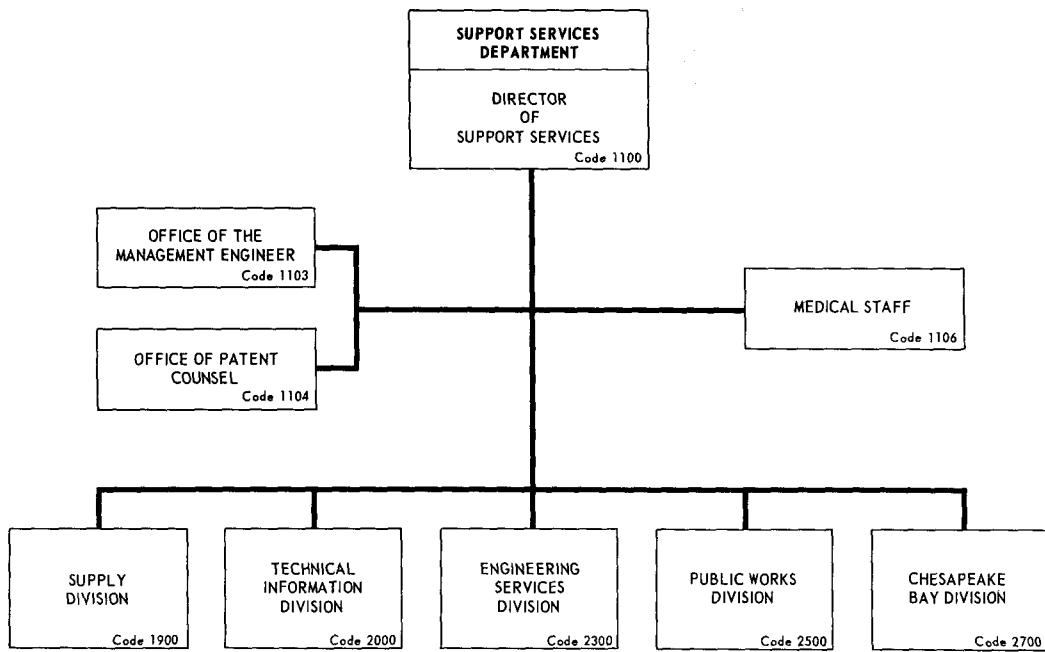
CAPT Maragos became Director of Support Services on May 29, 1967. In this position, he administers five divisions that provide engineering and other services in support of the Laboratory's research and development program.

THE SUPPORT SERVICES DEPARTMENT

The Director of Support Services is a Naval Officer with the appropriate rank, training, and experience. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required in support of the work of the Research Department.

Key Personnel

<u>Name</u>	<u>Title</u>	<u>Code</u>
CAPT G. Maragos, USN	Director of Support Services	1100
Mr. S. L. Cohen	Management Engineer	1103
Mr. R. S. Sciascia	Patent Counsel	1104
LT M. D. Lieberman, MC, USN	Medical Officer	1106
CDR O. L. Woodbury, SC, USN	Supply Officer	1900
Mr. E. L. Smith	Head, Technical Information Division	2000
CDR R. B. Hayman, USN	Engineering Services Officer	2300
LCDR C. F. Cook, Jr., CEC, USNR	Public Works Officer	2500
CDR R. S. Mason, USN	Chesapeake Bay Division Officer	2700



OFFICE OF THE MANAGEMENT ENGINEER

Basic Responsibilities

The Office of the Management Engineer provides staff support to management officials of the Laboratory in matters of administrative operations, management control, and facilities planning.

Key Personnel

Name	Title
Mr. S. L. Cohen	Management Engineer
Mr. A. M. Toscano	Deputy Management Engineer



Mr. S. L. Cohen

Personnel Complement

On Board: 8

OFFICE OF PATENT COUNSEL

Basic Responsibilities

The Office of Patent Counsel provides services concerning inventions, patents, trademarks, copyrights, and other related matters. Patent applications are prepared, filed, and prosecuted on NRL inventions of significance to the Government. The Patent Counsel serves as consultant and adviser on patent and data clauses in R&D and procurement contracts. Assistance is provided the Research Department through state-of-the-art searches in the patent literature pertinent to particular research problems.

Key Personnel

Name	Title
Mr. R. S. Sciascia	Patent Counsel
Mr. R. J. Erickson	Deputy Patent Counsel



Mr. R. S. Sciascia

Personnel Complement *

On Board: 22

*Includes personnel physically located at ONR headquarters.

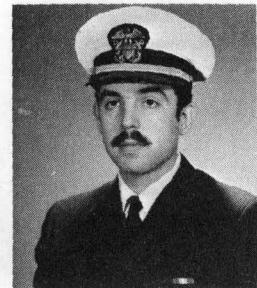
MEDICAL STAFF

Basic Responsibilities

The Medical Staff provides a comprehensive industrial health program. Its members serve in an advisory capacity on the Radiological, Safe Driving, Eye Hazard, and other Laboratory Committees, as directed.

Key Personnel

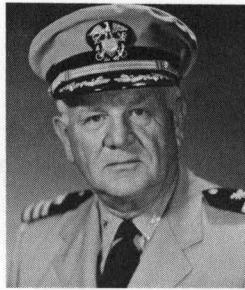
<i>Name</i>	<i>Title</i>
LT M. D. Lieberman, MC, USNR	Medical Officer
Mrs. H. N. East, RN	Occupational Health Nurse



LT M. D. Lieberman

Personnel Complement

On Board: 8
(Civilian 4, Military 4)

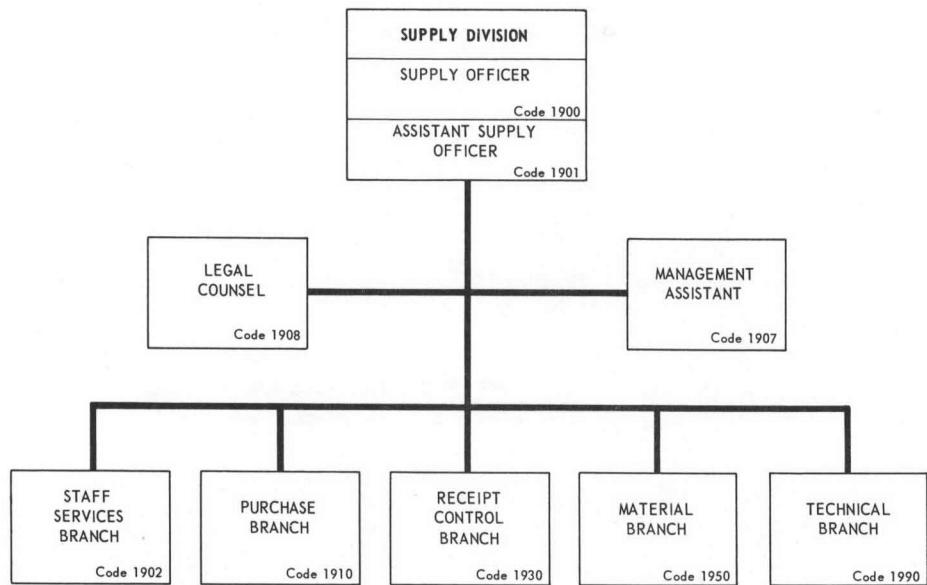


CDR O. L. Woodbury, USN

Supply Division



- STAFF SERVICES
- PURCHASE AND CONTROL
- MATERIAL
- TECHNICAL



Basic Responsibilities

The Supply Division provides service functions to the Laboratory including the operation of supply issue stores, procurement of equipment, material, and contractual services; receipt, inspection, and delivery of material and equipment; storage of inactive laboratory equipment; packing; shipping; traffic management; and survey and disposal of excess and unusable property.

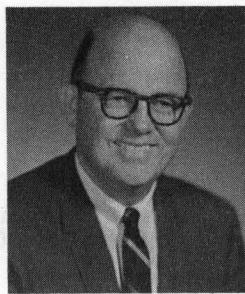
During FY-1968 the Supply Division occupied 183,000 square feet of building space; its stores inventory value averaged \$850,000; procurements totalled \$21,000,000; stores issued totalled \$2,123,000; and disposals totalled \$7,000,000.

Key Personnel

<i>Name</i>	<i>Title</i>
CDR O. L. Woodbury, SC, USN	Supply Officer
LT J. E. Simon, SC, USN	Assistant Supply Officer
Mr. A. S. Horton	Legal Counsel
Mr. L. Woods	Management Assistant
Mrs. P. Griffin	Head, Staff Services Branch
Mrs. I. L. Bivins	Head, Purchase Branch
Mrs. V. S. Thomas	Head, Receipt Control Branch
Mr. H. W. Dickinson	Head, Material Branch
Mr. R. R. Black	Head, Technical Branch

Personnel Complement

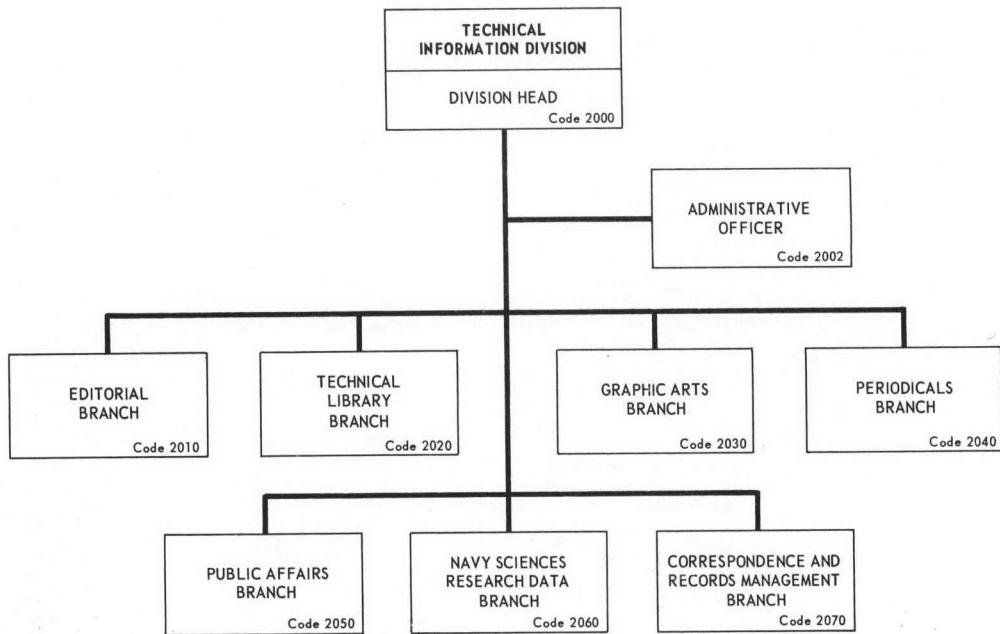
On Board: 149
(Graded 87, Ungraded 60, Military 2)



Technical Information Division

Mr. E. L. Smith

- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- PERIODICALS
- PUBLIC AFFAIRS
- NAVY SCIENCES RESEARCH DATA - ONR
- CORRESPONDENCE AND RECORDS MANAGEMENT



Basic Responsibilities

The Technical Information Division plans and administers the Laboratory's program of preparing and disseminating the results of scientific research through official publications, scientific journals, presentations, films, exhibits, and news media. It provides centralized professional services to both NRL and ONR in writing, editing, printing, exhibits, photography, graphic arts, public affairs, documentation, language-translations, and mail-records services. It operates one of the Navy's largest integrated technical libraries with holdings of 200,000 bound volumes and 350,000 technical reports.

Key Personnel

<i>Name</i>	<i>Title</i>
Mr. E. L. Smith	Head, Technical Information Division
Mrs. D. E. Cameron	Administrative Officer
Miss L. A. Morgan	Librarian
Mrs. D. P. Baster	Head, Library Services Section
Mrs. D. Folen	Head, Documents Section
Mr. W. H. Ramey	Head, Graphic Arts Branch
Mr. W. M. Leak	Head, Periodicals Branch
Mr. I. S. Rudin	Head, Editorial Branch
Mr. J. J. Lister	Head, Public Affairs Branch
Mr. R. Greenbaum	Head, Navy Sciences Research Data Branch
Mrs. M. G. Beall	Head, Correspondence and Records Management Branch

Personnel Complement

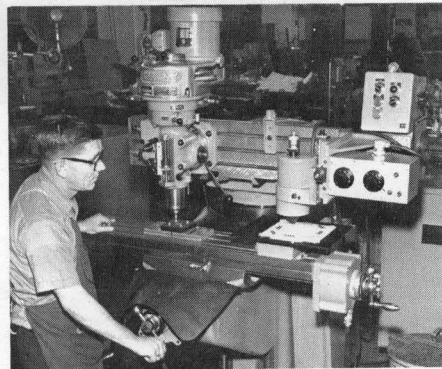
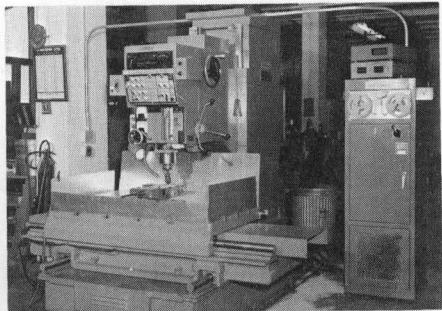
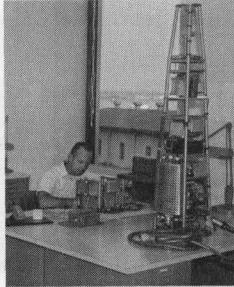
On Board: 172

(Graded 155, Ungraded 17)

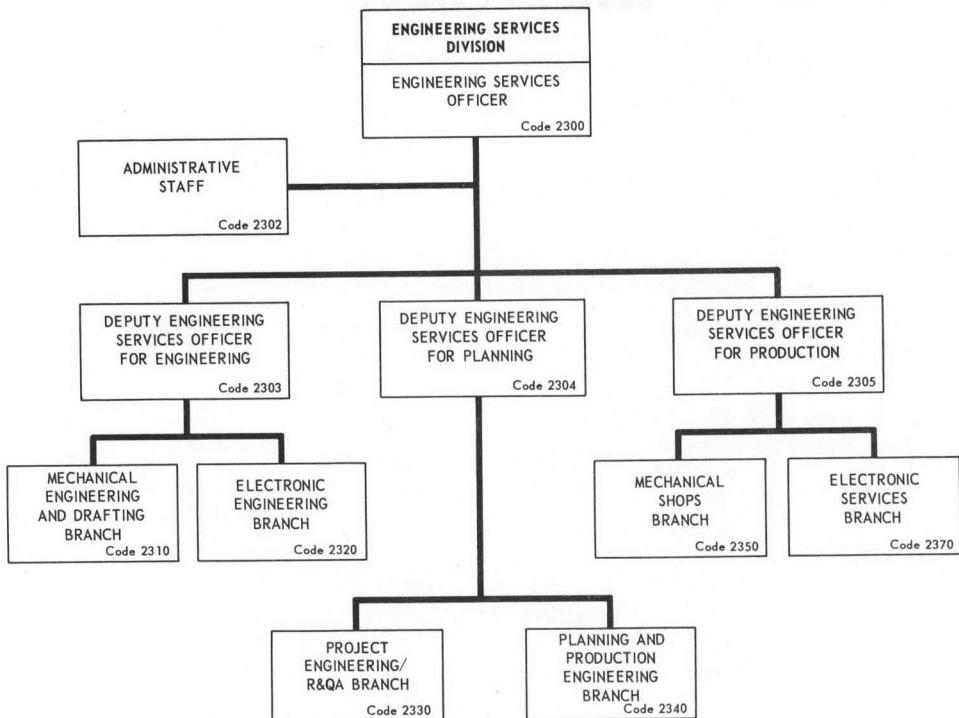


CDR R. B. Hayman, USN

Engineering Services Division



- MECHANICAL ENGINEERING AND DRAFTING
- ELECTRONIC ENGINEERING
- MECHANICAL SHOPS
- CHEMICAL PROCESSES SHOPS
- ELECTRONIC SERVICES
- PLANNING & PRODUCTION ENGINEERING
- PROJECT ENGINEERING



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

<i>Name</i>	<i>Title</i>
CDR R. B. Hayman, USN	Engineering Services Officer
Mr. P. R. Shifflett	Deputy Engineering Services Officer for Engineering
Mr. J. P. Manning	Deputy Engineering Services Officer for Production
Dr. L. A. DePue	Deputy Engineering Services Officer for Planning
Mr. C. T. McComb	Head, Mechanical Engineering and Drafting Branch
Mr. J. Brotzman	Head, Electronic Engineering Branch
Mr. D. R. Eggleston	Head, Mechanical Shops Branch
Mr. J. L. Leizear	Head, Electronic Services Branch
Mr. L. G. Votta	Head, Planning and Production Engineering Branch
Mr. E. Trexler	Head, Project Engineering/R&QA Branch
Mr. L. G. Murphy	Head, Parts Programming Section

Personnel Complement

On Board: 565

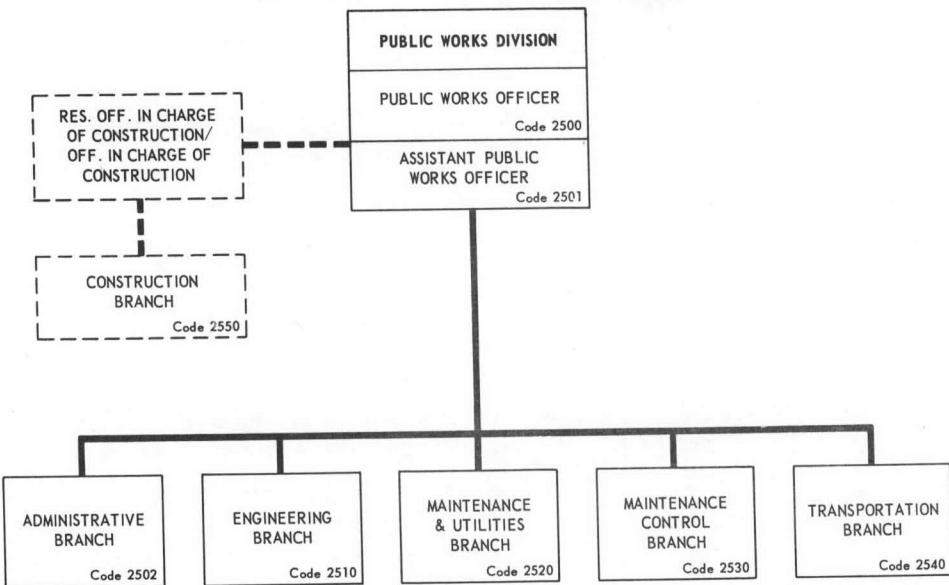
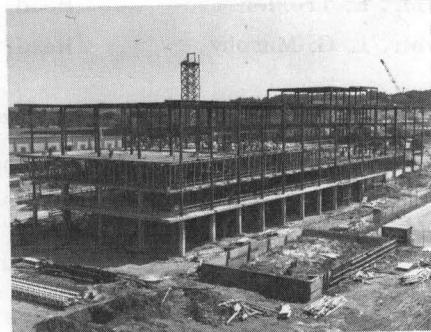
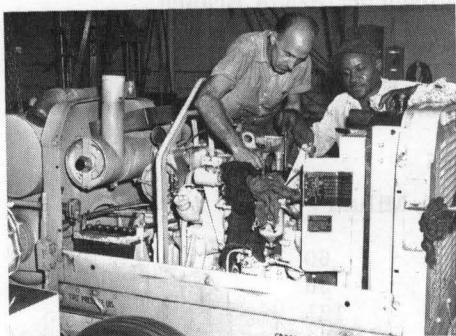
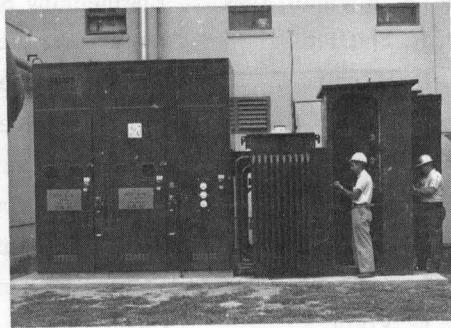
(Graded 181, Ungraded 383, Military 1)

Management & Staff	60
Engineers	36
Technicians	121
Journeymen	262
Machine Operators & Helpers	41
Apprentices	45



LCDR C. F. Cook, Jr., USN

- ENGINEERING
- MAINTENANCE AND UTILITIES
- MAINTENANCE CONTROL
- TRANSPORTATION
- CONSTRUCTION



Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight-handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

Key Personnel

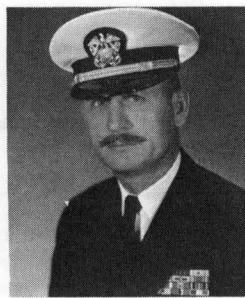
<i>Name</i>	<i>Title</i>
LCDR C. F. Cook, Jr., CEC, USN	Public Works Officer
LT F. W. Renshaw, CEC, USNR	Assistant Public Works Officers
Mr. J. R. Lescault	Administrative Officer
Mr. R. J. Zampell	Head, Engineering Branch
Mr. A. N. Gawthrop	Head, Maintenance & Utilities Branch
Mr. G. H. Seaver, Jr.	Head, Maintenance Control Branch
Mr. C. P. Trexler	Head, Transportation Branch
*LT R. C. McInnes, CEC, USNR	Assistant ROICC
*Mr. C. R. Parsons	Construction Engineer (ROICC/OICC)

Personnel Complement

On Board: 406

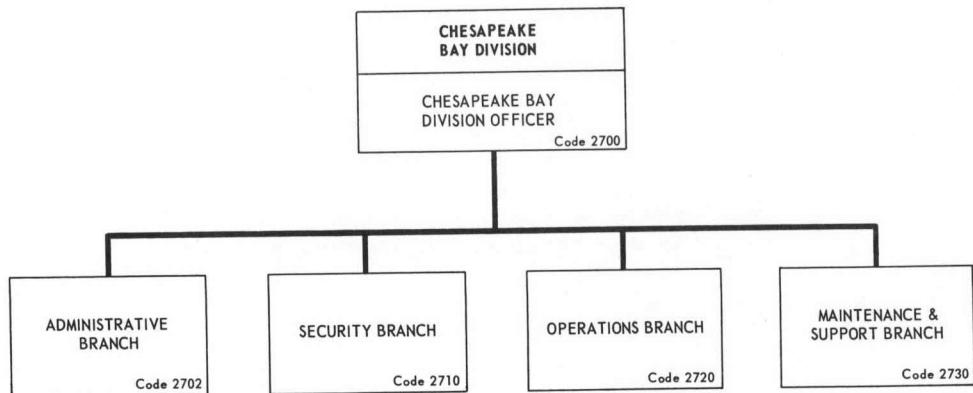
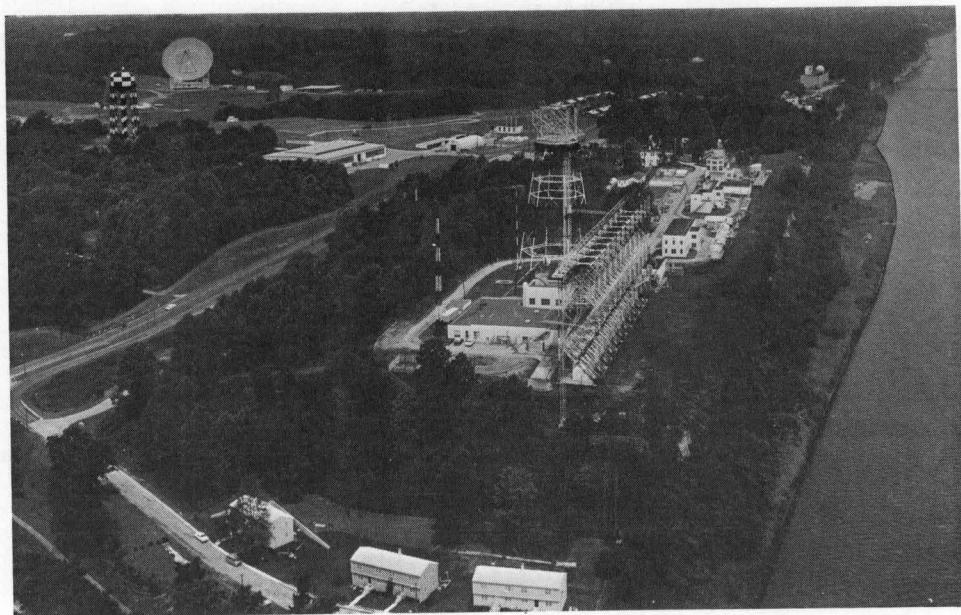
(Graded 48, Ungraded 356, Military 2)

*On ceiling of Naval Facilities Engineering Command (Chesapeake Division)



CDR R. S. Mason, USN

Chesapeake Bay Division



Basic Responsibilities

The Chesapeake Bay Division provides and maintains facilities and services for test, development and evaluation of radar, radio, and fire control equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

The Physical Plant

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 197 structures of various size and construction, six of which are major laboratory buildings. There is over 200 feet of usable dock space with a water depth of 4 to 7 feet, located 2 miles north of the main site. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a distance of about 10 miles; the Theodolite House, at North Beach; and the Off-shore Platform, approximately 2 miles southeast of CBD in the Bay.

One 36-foot diesel-powered boat and five wherries are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters and one dormitory.

Key Personnel

<i>Name</i>	<i>Title</i>
CDR R. S. Mason, USN	Division Officer
Mr. F. R. Theodore	Administrative Officer
Mr. K. V. Davis	Security Officer
BMCM G. VandenBerg, USN	Operations Officer
Mr. R. M. Conlyn	Station Engineer

Research Division Representatives

Applications Research Division

Mr. A. C. Grosvenor, Applied Physics Branch
Mr. C. D. Porter, Dynamics Branch

Radar Division

Mr. M. W. Lehman, Radar Geophysics Branch
and Division Representative
Mr. J. R. Ward, Equipment Research Branch
Mr. W. K. Fliss, Search Radar Branch

Solid State Division

Mr. T. H. Cosden, Applied Optics Branch

Personnel Complement

On Board: 88
(Graded 32, Ungraded 54, Military 2)

The Naval Research Laboratory has a continuing need for physical scientists, mathematicians, engineers, and supporting personnel. Vacancies are filled without regard to race, creed, color, sex, or national origin. Information concerning current vacancies will be gladly furnished upon request. Address all such inquiries to the Personnel Office (Code 1800), Naval Research Laboratory, Washington, D. C. 20390.

